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AGRICULTURAL MARKETING SERIES

MARKETING OF FISH IN INDIA

(THIRD EDITION)

54

C. E. T. P. I.

FISH TECHNOLOGY EXPERIMENT STATION,
Hoige Bazaar, MANGALORE-1.

16-1-68

Directorate of Marketing & Inspection
Ministry of Food & Agriculture
Government of India
NAGPUR

1961

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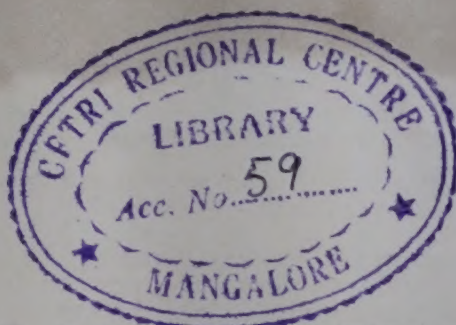


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FISH TECHNOLOGY EXPERIMENT STATION,
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Report on the Marketing of Fish in India

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PREFACE TO THE THIRD EDITION

The Second Edition of the Report on the Marketing of Fish in India containing data up to the year 1948-49 was published in 1951, before the inauguration of the First Five Year Plan. As a result of the programmes and projects launched during the First and Second Five Year Plans with regard to scientific development of fisheries, many changes have taken place. To assess the progress made and to make available the latest data in respect of production, utilisation, methods of preservation, cost of marketing, etc., essential for planned development of the fishing industry, a fresh survey was undertaken and the Report revised giving data up to the year 1957-58. To make the Report concise, some of the descriptive portions appearing in the earlier editions have either been summarised or omitted. With a view to enabling the readers to get a quicker grasp of the essential points, summary of the chapters along with the main conclusions and recommendations have been given at the end of the Report. It is hoped that the Report will serve its objective and be useful to those engaged and interested in the development of Fisheries in India.

The revision has become possible because of the active co-operation of the State and Central Fisheries Departments and also the State Marketing Staff who supplied as much data and information on the subject as they possibly could. Thanks are due to them.

Thanks and acknowledgements are also due to a large number of fishermen, merchants and others who willingly extended active assistance and co-operation in carrying out the survey.

Thanks are also due to the Fisheries Development Adviser to the Government of India who went through the draft report and gave some valuable suggestions.

The Government of India should not be regarded as assuming responsibility for any statements contained in the Report.

The Report was compiled by Shri B. D. Joshi, Senior Marketing Officer of this Directorate.

N. P. CHATTERJI,
*Agricultural Marketing Adviser
to the Government of India.*

Nagpur, 25th August, 1960.

The main Report contains data in some cases upto 1957 and in others upto 1958 according to the availability. Subsequent to the finalisation and printing of the Report, efforts were made to collect data on certain aspects *viz.*, marine fish catches, imports, exports, prices, etc. before its final printing (Pages 205-210).

CHAPTER I—TYPES OF FISHES

A—General

As a source of food, fisheries stand almost at par with animal husbandry for providing animal protein requirements of our people. Addition of fish to the daily diet of masses is particularly important in regions where the main staple food is rice. The Indian seas, estuaries and backwaters are rich in large varieties of edible fish but the exploitation and development of these important sources of rich food only engaged the serious attention of the Government of India after the partition of the country and during the two Five Year Plans.

Evidence is not wanting that a substantial percentage of the catch landed at present is allowed to go waste. Scattered fishing centres, primitive methods of catching, preservation and transport, and the inadequacy of marketing facilities are mainly responsible for this state of affairs. In India, the occupation of fishing and dealing with the fish are looked upon as a mean one and are carried out exclusively by the lower classes. There are very few instances of educated men with capital, entering the fishing industry. The result is that the fishing industry in India is essentially a cottage industry, financed by a large number of petty owners and traders and worked mostly by the illiterate section of the population. This has also been responsible for the extremely backward condition of the fishing industry which suffered neglect and ignorance for a long time.

Recognising the need and importance of development of fisheries the Planning Commission placed the development of fisheries on a national footing. Whereas in the First Plan, emphasis was laid on schemes for overcoming food shortages, the objective of the Second Plan was to increase the *per capita* consumption and build the fishing industry on modern and scientific lines. During the Second Five Year Plan, efforts have been made to increase the production, both of fresh and sea water fish and to achieve the production target of 14.5 lakh tons by 1961.

“Fisheries” has been a State subject and many State Governments in India till recently insisted upon the Fisheries Department paying their own way. This attitude was deprecated by the Royal Commission on Agriculture as early as in 1928. The All India Fisheries Conference held in Madras in 1956 had also resolved that “(i) The Fisheries Departments be considered as Development Departments and not as Revenue Departments, and (ii) The State Governments set up independent departments for Fisheries Development where they do not exist already.” This view was further supported by the State Ministers’ Conferences held in 1957 and 1958.

B—Nomenclature

In a country of the size of India with its extensive sea-board, perennial rivers and irrigation canals, and innumerable rain-fed tanks and *jhils* the physical and biological conditions under which fisheries exist are very varied.

Most fishes are known by different local names (Indian languages) in different parts of the country. In the markets, or in the fisherman's dialect, several species of the same genera are generally known by one name in different languages unless the characteristics are strikingly different. Thus there are long lists of Gujarati, Marathi, Canarese, Tamil, Telugu, Oriya and Bengali names both for marine fishes and for freshwater varieties. Fishes of different types and even of separate genera sometimes are known by the same vernacular name in two different regions. For instance, *Rohu* is the common vernacular name for the carp *Labeo rohita* in upper India, while the same in Hyderabad is applied to the species *Labeo Calbasu*. There are also instances where the same fish in different stages of its growth is known by different names. For example, in West Bengal the *silond cat* fish in the immature stage is called *Silun* and *Dain* when fully grown.

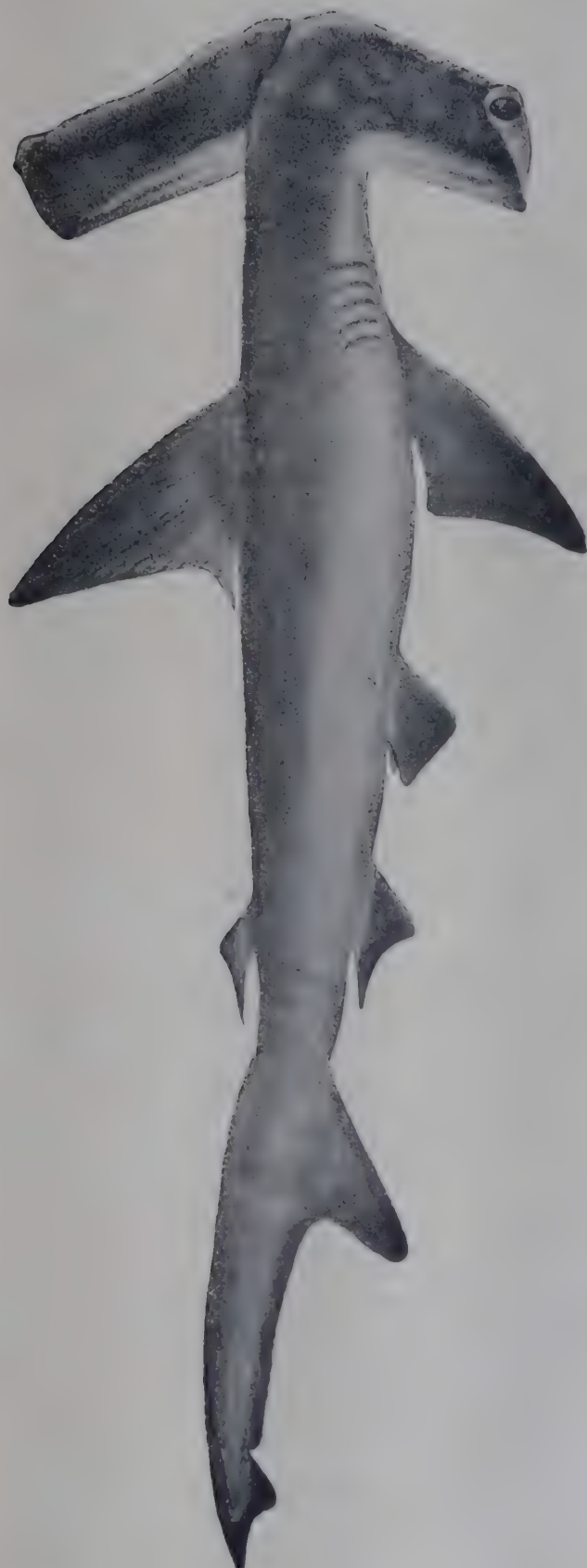
Certain *empirical* names have become associated with the popular and more common varieties of fish. Some of these *e.g.* the mackerel, the anchovy, etc. have been used to designate Indian species which are closely related to varieties found in the Atlantic and having such names. Unfortunately, even these popular English names do not always connote the same species everywhere.

It is obvious from the above that the vernacular names or the popular English equivalents thereof cannot be wholly used in this Report without the risk of confusion.

The first comprehensive and systematic classification of fishes on an all-India scale was made by Dr. Francis Day in his "Fishes of India" (1876-1889) and published in his two volumes on "Fishes", in the *Fauna* of British India series. Although much useful work has been done by the certain State Departments of Fisheries and the Fisheries Research Stations of the Government of India, to define the characteristics of certain local types, and re-name certain species, even to-day the nomenclature as adopted by 'Day' is common and is widely accepted. In this Report, therefore, the same has been adhered to. Appendix I gives the scientific and popular names and the vernacular equivalents in some Indian languages for the commercially important fishes of India.

C—The commercial fisheries of India.

Fish are caught from every piece of water in this country. The chief sources of supply are the coastal margins of the sea, river-estuaries and backwaters for marine and estuarine fish, and rivers, irrigation and other canals, lakes inundated tracts, *jhils*, etc., for freshwater fish.



THE HAMMER-HEADED SHARK
Zygaena blochii
(Length up to 4 feet)

“Fishes of India”, Day.



CAT-FISH
Arius sona
(Length up to 3 feet)

"Fishes of India", Day.

India has a coast-line of 2,920 miles exclusive of sinuosities and indentations and the total area of the sea which lies between the coast and 100 fathoms line known as the continental shelf is approximately 110,000 square miles. Only a small portion of this area is worked; there is practically no deep sea fishing, the boats are generally of the catamaran or canoe type. Only recently in the east coast of Madras and West Bengal and the west coast of Kerala and Bombay mechanised fishing has been introduced and the vessels go far and do deep fishing.

Most of the Indian rivers form extensive estuaries before they join the sea. Near the river mouth the water is brackish owing to tidal influence and several valuable species of fish and crustaceans acclimatised to changes in salinity are caught in the estuarine regions. Estuarine lagoons—generally known as backwaters which extend from the mouths of all important rivers and streams and generally bounded on the seaward side by a narrow belt of sandy land—also yield several varieties of food fish. Several species of edible fish are also caught from freshwater sources all over the country. The estuarine and riverine fisheries are important as they already supply considerable quantities of fish and are free from many of the difficulties attending deep sea fishing. The supply could be increased by undertaking development measures in accordance with up-to-date methods of fish farming, but the subject is complicated owing to the habits of the fish, the customs of the country and in regard to latter, also by the nature of the rivers and the irrigational use made of them. Inland waters such as reservoirs, tanks, ponds, etc. belong to a different and simple class of fishery. But unlike in other countries, only a few of these confined waters are devoted wholly or in part to deliberate food production (Pisciculture) in India.

Certain types of fish which are caught in appreciable quantities have been classified into 16 groups and are described in the "Preliminary guide to Indian fish, fisheries, methods of fishing and curing", Marketing Series 66 which may be referred to for details. In the table No. 1 below localities where these are chiefly caught are given :—

TABLE No. 1

The chief commercial fishes of India and the localities where they are chiefly caught

Name of the fish	Localities where chiefly caught	Remarks
I. Elasmobranchs group—		
(a) Sharks—		
(i) <i>Carcharhinus gangeticus</i> (M.H.)	Coastal waters, chiefly in the Bay of Bengal & in large tidal rivers.	60 species of cartilaginous fishes are known to exist in Indian seas (Day).

TABLE NO. 1—*contd.*

Name of the fish	Localities where chiefly caught	Remarks
I. Elasmobranchs group— <i>contd.</i>		
(ii) <i>Galeocerdo rayneri</i>	More common in the Arabian Sea, off Malabar and Travancore.	Liver oil is very rich in Vitamin A.
(iii) <i>Sphyrna blochii</i> (C.)	Commonest shark on the west coast. Young ones are also seen in large numbers.	Not highly esteemed as food.
(b) Saw fish— <i>Pristis cuspidatus</i> Lath	In the seas and even high up in the large tidal rivers.	Liver oil is very rich in Vitamin A.
(c) Skate— <i>Rhynchobatus djedensis</i> (Forsk).	Caught in the Bay of Bengal coast in large quantities.	Not highly esteemed as food.
(d) Rays— <i>Dasyatis</i> (<i>Pastinachus</i>) <i>sephen</i> (Forsk).	Common all along the west coast during the South-west monsoon.	Ditto.
II. Eels group—		
(a) Marine— <i>Muraenesox talabonides</i>	Bombay coast.	30 species of eels are known to exist in Indian waters of which 20 are marine eels (Day).
(b) Freshwater— <i>Anguilla bengalensis</i> (Grey and Hardu).	In running waters. Sometimes in paddy fields.	
III. Cat-fishes group—		
(a) Marine— (i) <i>Tachysurus dussumieri</i> (V.).	Common on the west coast appearing off Bombay during November to March and Kerala during April to October.	



THE OIL-SARDINE
Clupea longiceps
(Length up to 8 inches)

"Fishes of India", Day.



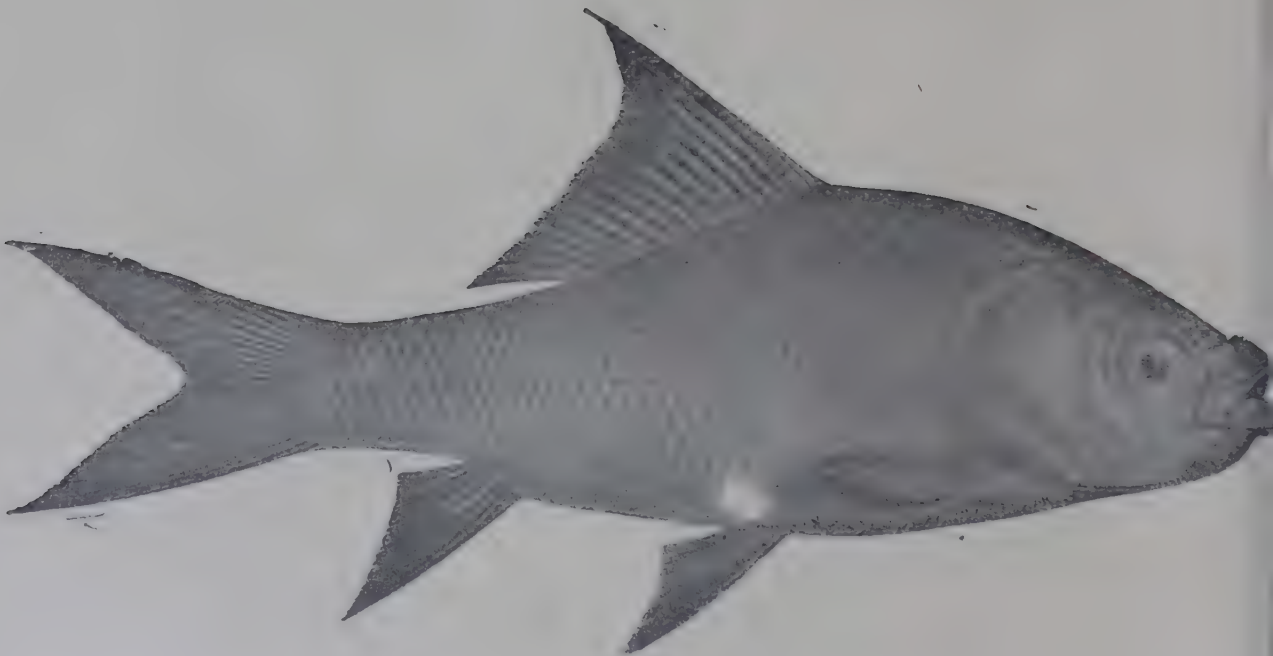
shes of India", Day.

THE INDIAN MACKEREL
Scomber microlepidotus (Length up to 12 inches)



THE SILVER PELLY
Epuula splendens
(Length up to 6 inches)

"Fishes of India", Day.



THE CATLA
Catla buehanani
(Length up to 4 feet)

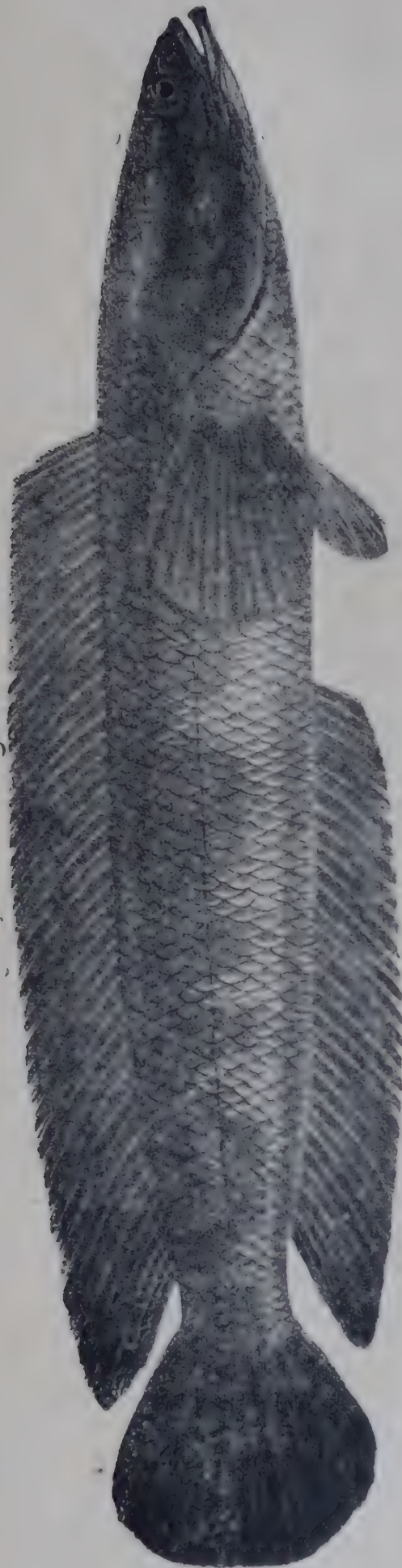
"Fishes of India", Day.

TABLE NO. 1—*contd.*

Name of the fish	Localities where chiefly caught	Remarks
III. Cat-fishes group— <i>contd.</i>		
(ii) <i>Tachysurus sona</i> (Ham.)	Bombay coast.	28 species of marine cat fishes are known to exist in the Indian seas (Day).
(b) Freshwater—		
(i) <i>Wallago attu</i> (Schn.).	Adults only in the large northern Indian rivers, small specimens are seen in all fresh waters.	Over 80 species of cat fishes are known to exist in the fresh waters of India (Day).
(ii) <i>Bagarius Bagarius</i> (Ham.).	Only in northern Indian rivers.	
(iii) <i>Pangasius Pangasius</i> (Ham.).	Only in the large northern Indian rivers.	
(iv) <i>Silonia Silonia</i> (Ham.).	Only in the large northern Indian rivers.	
(v) <i>Mystus seenghala</i> (Syckes).	Distributed in fresh waters throughout India : Large ones in river systems.	
(vi) <i>Elupisoma Garua</i> (Ham.).	Only in the large northern Indian rivers.	
(vii) <i>Clarias Batrachus</i> (L.).	Distributed in fresh water throughout India.	
(viii) <i>Hetropneustus Fossilis</i> (B.)	In Malabar, Madras, and West Bengal.	
IV. Silver-bar fish group—		
<i>Chirocentrus dorab</i> (Forsk.).	Off Bombay coast, in the southern section of the Madras east coast and in the Sunderbans.	

TABLE NO. 1—*contd.*

Name of the fish	Localities where chiefly caught	Remarks
V. The Herrings and the Anchovies group—		
(i) <i>Sardinella longiceps</i> (V.)	South-west coast.	45 species of anchovies are known in Indian waters.
(ii) <i>Sardinella fimbriata</i> (V.)	All along the coast. In large quantities in the Bay of Bengal coast.	
(iii) <i>Hilsa ilisha</i> (Ham.).	Estuarine regions of the Sabarmati, Cauveri, Krishna, Godavari, Mahanadi and the Ganga at the time of floods.	
(iv) <i>Thrissocloes Purava</i> Ham. Buch.	All along the coasts in varying quantities.	
(v) <i>Engraulis telara</i> .		
VI. Bombay Duck group—		
<i>Harpodon nehereus</i> (Ham. Buch.)	Abundant off Bombay coast in small quantities in the estuaries of West Bengal.	
VII. Feather-backs group—		
<i>Notopterus</i> Spp.	In the fresh and brackish waters of India.	Two species are known of which <i>Notopterus chitala</i> is larger.
VIII. The Mackerels and the Perches group—		
(i) <i>Rastrelliger Kanagurta</i> (C.).	South-west coast of India.	Altogether about 210 species comprising 60 mackerels and 150 perches are known to exist in the Indian seas (Day).
(ii) <i>Scomberomorus guttatus</i> (schn.).	All along the coast: abundant near the estuaries of larger rivers.	
(iii) <i>Scomberomorus commersonii</i> (Lac).		



THE SANKE-HEADED FISH
Ophioccephalus striatus
(Length up to 3 feet)



THE ROHU

Labeo rohita

(Length up to 3 feet or more)

"Fishes of India", Day.

TABLE NO. 1—*contd.*

Name of the fish	Localities where chiefly caught	Remarks
VIII. The Mackerels and the Perches group— <i>contd.</i>		
(iv) <i>Lates calcarifer</i> . (Bloch.).	All along the coast : abundant near the estuaries of larger rivers.	
(v) <i>Trichiurus haumela</i> (Forsk)	Abundant on the Madras and Kerala coasts.	
(vi) <i>Trichiurus Savala</i> (C.).	All along the West coast, abundant on the Bombay coast.	
(vii) <i>Caranx</i> (Selar), <i>crumenophthalmus</i> , Bloch.	South-west coast of India.	
(viii) <i>Etroplus suratensis</i> (BL).	Brackish waters.	Can be acclimatised to fresh water.
IX. Silver bellies group—		
<i>Leiognathus</i> & <i>Gazza</i> Spp.	South-west coast of India.	
X. Pomfrets group—		
(i) <i>Chordoplites Chinensis</i> (Euphr).	In the gulf of Cambay and in certain areas of the Coromandel coast. Caught in small quantities all along the coasts.	
(ii) <i>Pampus asgenteus</i> (Euphr).		
XI. Flat fishes group—		
<i>Cynoglossus</i> , <i>Pseudohombas</i> Sp. etc.	Large specimens off Gujarat and Bombay coasts and small ones along the Kerala West coast.	Several species of soles and tongue fish are known to exist in Indian seas.
XII. Mulletts group—		
(a) Marine—	} In the larger river estuaries.	25 species of mullets are known in the Indian seas. Many of these ascend rivers and can be acclimatised to residence in fresh water.
(i) <i>Mugil speigleri</i> , Bleeker.		
(ii) <i>Mugil cephalus</i> (Limn).		

TABLE NO. 1—*contd.*

Name of the fish	Localities where chiefly caught	Remarks
XII.—Mullet group— <i>contd.</i> (b) Freshwater—		
(i) <i>Liza corsula</i> (Han. Buch).	In the larger rivers.	4 species of mullets are known to reside in the freshwaters of India.
XIII. “Indian salmon” group—		
(i) <i>Eleutheronema tetradactylus</i> (Shaw).	Chiefly near the mouths of tidal rivers.	
(ii) <i>Polynemus paradiseus</i> (Limn).	In the estuaries of Bengal. Abundant on the Kathiawar coast.	
XIV. Jew fishes group—		
<i>Otolithus Pseudosceina</i> <i>Johnius</i> Spp. etc.	Bombay, Travancore & northern section of the Madras east coast.	Several species are known some of which come in shoals.
XV. “Live” fishes other than cat fishes group—		
(i) <i>Channa</i> Spp.	In all tanks, pools, jhils: mostly in stagnant water.	So called because they are able to live out of water due to the presence of accessory breathing organs.
(ii) <i>Anabas testudinus</i> (Bloch).	Estuaries & freshwaters of India.	Several species are known which differ only in their colouration.
XVI. Carps group—		
(i) <i>Labeo</i> Spp.	} In streams, rivers and tanks all over India. } Larger specimens are invariably found only in northern India.	Several species of carps are found in the different parts of India.
(ii) <i>Catla Catla</i> (Ham)		
(iii) <i>Cirrhina mrigala</i> (Ham).		
(iv) <i>Tortor</i> (Ham).		

Among shell fish, the crustaceans, *viz.*, prawns, crabs and certain molluscs, *e.g.*, clams and oysters are edible. The commercially important varieties of shell fish used for food have also been described in the

"Preliminary guide" referred to previously. The areas where these are chiefly caught may be seen in the following table :—

The chief commercial shell fish (edible) of India

Name of the shell fish	Localities where chiefly caught	Remarks
Crustaceans group—		
1. Prawns—		
(a) Marine		
(i) <i>Penaeus</i> Spp.	Off west coast in the back-waters of Cochin and Travancore, in the Chilka lake; and in the estuarine regions of West Bengal, in Gulf of Kutch and off Bombay coast.	Several species are known to exist in Indian waters.
(ii) <i>Leander styliferus</i> M. Edw.		
(iii) <i>Metapaneans monoceros</i> (Fabre).		
(b) Freshwater— <i>Palaemon</i> Spp.	In the larger rivers; Collair Lake in Andhra Pradesh.	
2. Lobsters—		
<i>Panulirus</i> Spp.	Chiefly in West Bengal.	
3. Crabs.		
(a) Marine—		
(i) <i>Scylla serrata</i> (Fork)	All along the coast in varying quantities.	Several species are known to exist in Indian waters.
(ii) <i>Neptunus pelagicus</i> (Limn).		
(b) Freshwater—		
<i>Pratelphusa spinigera</i> .	In rivers, lakes & canals.	
4. Clams—		
<i>Ionax</i> Spp.	In the creeks and estuaries of Bombay. Small quantities are caught all along the coasts.	
<i>Meretrix</i> Spp.		
5. Oysters—		
<i>Ostrea</i> Spp.	Ennore Pulicate & Sonapur.	Oyster beds are often ruined through industrial & sewage pollution.

In addition to the above-mentioned shell-fishes which are fished and consumed in large quantities, there are several other species occurring along the coasts, which are of local interest and which are fished for local markets. They are sea-mussels, Cockles, razor-shell, whelks, cuttle-fish & squids. Sea-mussels are rare, but their flesh is highly esteemed. They are often found in oyster clumps. Whelks are not used as food on a large scale. In the sandy beds of the Bombay coast, whelks are fished along with clams. Squids and cuttle-fish are of some economic importance on the west coast. Large quantities of these molluscs are sun-dried. They are caught along with other edible fish by the fishermen. Cuttle-fish is also valuable for its shell which is used in medicine as well as for polishing wood. Cuttle-fish shells are often found washed ashore. Its flesh is extensively used as a bait by line fishermen.

The pearl oysters and chanks are fished for the commercially valuable pearls and the chank shells respectively. These fisheries are briefly described below :—

(a) *Pearl fisheries*—There are two types of oysters which are sought after the window-pane oyster (*Placuna placenta*) whose shell is used for decorative purposes and the true pearl oyster (*Pinctada vulgaris*).

Window-pane oysters are mostly found in our creeks and backwaters from Kutch region upto Ratnagiri. Fisheries for these shells have existed for many years in the Rann of Kutch and on the Bombay coast and the object of these fisheries has been to collect the small seed pearls, which, though lacking in lustre and shape, are used widely in indigenous medicine.

The true pearl oysters are found in the Gulfs of Kutch and Mannar but the latter fishery is of greater importance. The Kutch fishery is worked only as a cottage industry and fisheries in the gulf of Mannar are erratic in occurrence but have been worked in the past, once in fifteen years. In recent years, however, Pearl fishery is being conducted more frequently by the Madras State Government off the Tuticorin coast. Pearl fishing is a Government monopoly and is conducted under the supervision of the Madras Fisheries Department with the help of divers who volunteer for the work. Facilities such as towage to and from the fishing ground, buoying of beds, provision of camping quarters, etc., are provided for the divers by the Government free of cost. The oysters are found in about 10-11 fathoms of water and the only diving apparatus used by the Indian and Ceylonese divers is a large stone to help them to descend quickly. They remain submerged for about one minute at a time. In recent years the Madras Government has procured Aqua-Lung apparatus for training divers to remain under water for longer periods. The oysters collected are assembled and counted and one-third of the total catch is given to the divers as wages. During the year 1955, 35 lakhs of oysters were fished. During 1956, the number of oysters fished decreased to 21 lakhs but during the year 1957 the

number of oysters fished increased to 112 lakhs as will be seen from the following table; which gives certain details of pearl fishery by the Madras State Government during the years 1955 to 1957 :

	1955	1956	1957
1. No. of working days	44	18	46
2. No. of boats employed	2,297	325	1,883
3. No. of divers	23,821	3,483	20,284
4. Total catches (Number of oysters)	35,08,967	21,29,058	1,12,31,370
5. Government share of the total catches (Oysters).	23,39,312	14,19,371	74,87,580
6. Revenue realised in Rupees	1,36,527	44,795	1,66,367

In Bombay State the pearl fishery is conducted every fourth year. Till the year 1952-53 the fishermen were paid in kind in the form of clothes, etc. Since 1953 the fishermen are paid in cash ranging from 25 to 37 nP. per oyster.

During the year 1956, 441 divers were employed for the pearl fishery and 35,389 oysters were collected which yielded only 28 tolas of pearls worth about Rs. 7,000.

The window-pane oyster fishery is conducted at Ghumara and Ajad in Bombay State. The fishery is leased out by the State Fisheries Department. About 100 fishermen who are employed in this fishery are paid Rs. 18 per tola of pearl-dust (small size pearls) collected. The shells, after removing the pearl-dust, are utilised in the manufacture of calcium at Mithapur factory.

The total revenue realised by the Government during the years 1954-55 to 1956-57 is given below :—

	Rs.
1954-55	26,555
1955-56	24,025
1956-57	14,241

Research is in progress at the Fisheries Biological Station, Krusadai Island, Madras, on the possibilities of rearing pearl oysters in captivity and for inducing production of culture pearls.

(b) The chank fisheries (Xancus) of Madras are worked off on the east coast in the five southern maritime districts *viz.*, Tirunelveli, Ramanathapuram, Tanjore, South Arcot and Chingleput. The most productive beds are chiefly in the Gulf of Mannar near Tuticorin and Kilarai, and in the Palk Bay near Devipatnam and Rameshwaram.

The chank fishing is done during October-May in the Gulf of Mannar and from June-August in the Palk Bay, when the weather is favourable and waters are clear. The diving operations are conducted on all days of favourable weather except on holidays. Usually ten divers go on each boat. The chank merchants own launches which drag 10-15 boats with fishermen to the chank belts about 2-5 miles off the coast. 500—2000 chanks are reported to be collected every day. At the end of the day the chanks are brought to the lessees chank godown where the chanks are gauged and classified into four categories namely full sized, under-sized, wormed and No. 9 chanks. Full sized are those that measure over $2\frac{3}{8}$ " in diameter across the widest part and these are paid for if not affected by worms. The other three kinds are confiscated and not paid for. The under-sized shells are those that measure $2\frac{3}{8}$ " and less in diameter and they are returned to the sea if alive. No. 9 chanks are those that measure between $2\frac{1}{4}$ " and $2\frac{3}{8}$ " but they are included with the full sized chanks for sale which is done by calling for tenders at the end of the season. The number of divers that take part at Tuticorin chank fishery is about 300 and they fish about 100 working day. For each full sized chank the diver gets 36 nP. Chanks days in a season. The average earning of a diver is Rs. 3.31 nP. per are also caught in "Nandu yalai" (crab-net) in the Devipatnam area of Ramanathapuram district. Each fisherman secures 10-15 chanks per day.

The statement showing the number of chanks fished, price, etc. during the years 1939-40 to 1956-57 are given in Appendix No. II.

In Bombay State the chank fishery conducted by the Fisheries Department annually begins in April and ends in June. The method of collection of chanks by dip is locally known as 'Gop' chanks measuring $3\frac{1}{2}$ " and above in diameter are paid at the rate of 37 nP. per chank.

The chank beds along the east are far more extensive and productive than those on the west coast. However, chank shells fished from the Gulf of Kutch are of good quality and they fetch a very high price. Unlike on the east-coast where divers are employed for the collection of shells from the beds in waters up to ten fathoms of depth, those in the Gulf of Kutch are exposed at low water spring tides and the chanks are hand-picked by the fishermen.

Chank shell is put to several uses in India. Small shells are used as feeding cups for infants and for tying round the neck of cattle to ward off "evil eye". Bigger shells are used for blowing and for offering *puja* in temples. The largest number of mature shells are used, however, for making chank bangles, rings, ornaments, buttons, etc. The work is carried on in West Bengal as a cottage industry. A good quality lime is produced from calcined chank shells which is used for building purposes as also in medicine. The chank meat is edible as a dried product which is used as fried or as an ingredient of curry. The operculum of the chank is used in the manufacture of scented sticks to control the burning.



CATAMARAN LOGS.



RATNAGIRI SHARK-DRIFTER



OUT-RIGGER CANOE USED FOR FISHING WITH THE RAMPANI NET.



MASULA BOAT USED FOR IN-SHORE FISHING ON THE MADRAS EAST COAST.

CHAPTER II—FISHING GEAR AND METHODS OF FISHING

To suit local environmental and biological requirements, several distinct types of fishing crafts and implements have been evolved in the country. The factors which have influenced their design are the physical characteristics of the coast-line or the nature of the (Inland) water, the types of fish available and the habits of such fish, the proximity of any harbour in which the fishing boat may take shelter in storm and lastly the nature of the demand for fish.

A—Fishing vessels

(1) DESCRIPTION OF THE TYPES OF FISHING VESSELS

Sea fishing is carried on mainly in small crafts having a displacement of under five tons, in coastal water from 5 to 7 miles from the shore and within a depth of 10 fathoms. With the exceptions of a few off-shore fishing boats operating from certain localities very few fishermen make voyages which would entail staying out in the open sea longer than 12 hours at a time.

(a) *Sea craft*—(i) *West coast*—Dug out canoes—The Canoe is made by scooping out material from a large trunk of 'aini'* or 'cheeni' wood. The keel portion is left thicker than the sides. They are of two sizes suited for different purposes. The larger ones which run to 32 to 35 ft. in length by three feet wide and $2\frac{1}{2}$ ft. deep and of three to five tons burden, are usually used in pairs, chiefly for working bag nets. The smaller ones averaging two tons in weight (24 ft. $\times$ 3 ft. $\times$ $1\frac{1}{2}$ ft.) are used by drift or cast net fishermen. The larger boats usually carry a crew of seven and the smaller of only three or four. The bigger canoes have a bamboo mast 15 ft. high and a simple sail while the smaller ones generally have two masts and a large canvas sail. The average life of a dug out canoe is about 50 years.

The physical characteristics of the West and East coast of India are very much dissimilar. In the fine weather which prevails on the West-coast for 8 months from October to May, boats may go out regularly to the sea in the morning with a strong land breeze and return in the afternoon with the help of sea breeze. The coast is not broken by surf and small crafts can be easily launched or beached. The migratory fishes like Sardines and mackerels come near the shore in large shoals, especially, in the North and South Kanara and in the Malabar district. That is why the dug out canoes of this area have been found quite suitable for fishing. During the south west monsoon, however, the sea becomes very rough and fishing has to be suspended.

*These are Malyalam names.

Fishermen engaged in shark fishing even though they may have to proceed far into the sea prefer the smaller flat bottomed canoe on account of the ease with which a large shark can be loaded into it.

Boats : The largest of the fishing boats, called *Machwas* (see lower plate facing page 12) are used by Ratnagiri fisherman for off shore sea fishing. They are between five and ten tons displacement, measuring about 30 ft. $\times$ 9 ft. 6" $\times$ 3 ft. 6" and are of good sea going capacity and sailing power. They are generally built of teak frame and planking with subsidiary upper strakes of mango wood. They carry a single mast, and a great press of sail. They are low free board boats, low in the waist but without deck or a separate place for nets. They are mostly used for off shore fishing with big meshed drift nets. Smaller boats are also used by drift net fishermen and are constructed on the same model.

A special type of boat is required for fishing with the *Rampani* net used in the Konkan and Kanara districts. It is called *Akada hodi* (see upper plate facing page 13) in the Konkan and *Padava* in Malabar. In size, these boats range between 16 and 20 feet in length. The basal part of the hull may consist either of a dug-out region with low vertical sides about 3 inches high or of three planks a bottom plank and two narrow vertical side planks rabbetted* to the sides of the basal one.

The boats described above as well as the canoes operating in the southern districts of the Bombay State have out-rigger equipments. The out-rigger is formed by the two curved bamboo poles (bowkar) and a float (uldi). The poles are laid across the waist of the boat and extend five to six feet on one side of the boat. They are so tied that the distance between the poles decreases towards the distal ends. To these is directly attached the light wooden float, made generally of the timber called *Muruka* in Malayalam (*Erythrina indica*).

(ii) *East coast—Catamarans***.—The characteristic sea fishing craft of the east coast is the catamaran. It is a keel-less raft formed by lashing together three to five pieces, occasionally seven pieces, of light rough-hewn wood. The logs (see upper plate facing page 12) are from 16 to 20 ft. in length and over 4' in girth, out square on one edge and carved into a rough cone at the other. The conical end rises slightly above the general level of the raft, and forms the stem of the catamaran. All the logs are not of the same length. These primitive crafts use a bamboo mast and a simple canvas sail.

On the east coast the estuaries of large rivers harbour the fishing crafts. The surf breaks heavily upon this coast throughout the year and

*See glossary.

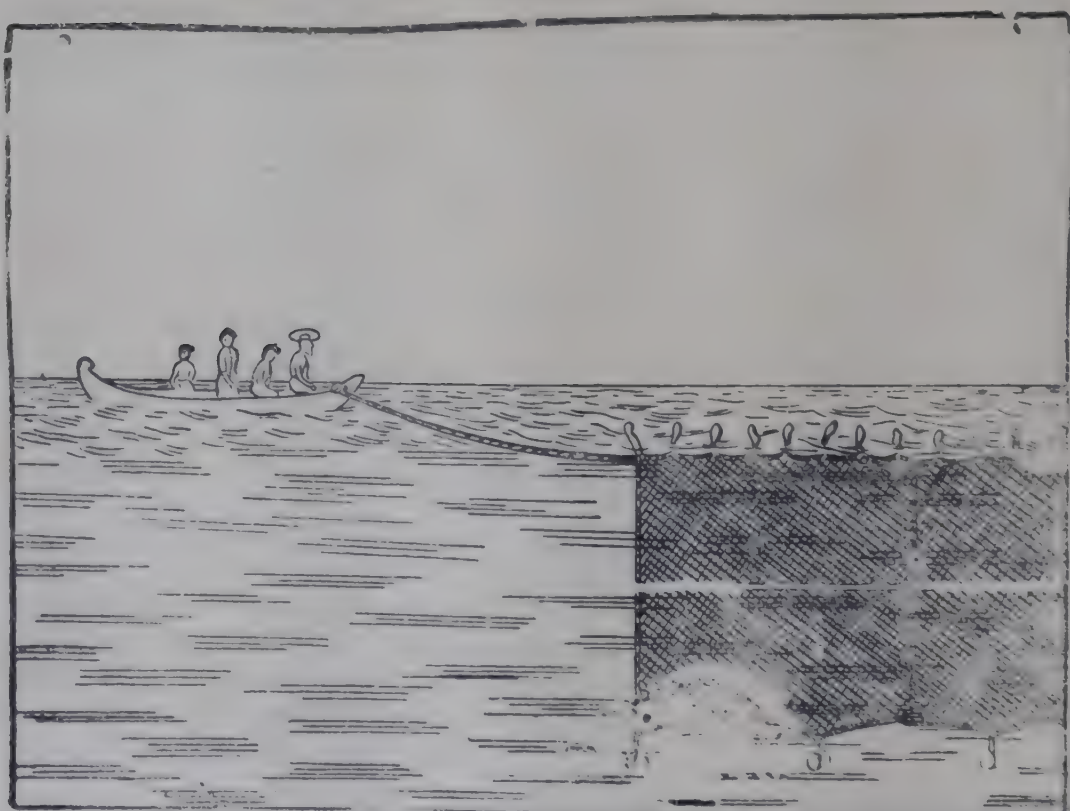
**Derived from *Kattu maram*. In Tamil. *Kattu* means lashing and *maram* means timber. This is a keel less raft.



BOATS USED FOR THE TRANSPORT OF DRIED FISH IN ASSAM.



FISH CARRIER, *Chhip*, FOR TRANSPORT OF FISH IN BENGAL.



THE MODE OF OPERATION OF A DRIFT OR GILLING NET.

the common fishing craft used is the catamaran. In the effective simplicity of its design, in the safety with which it can be launched and brought ashore through the wildest surf, the ease with which its parts may be taken apart and carried up the beach and afterwards reassembled, the catamaran is perhaps the safest craft for use on this surf-beaten coast. A sandy beach is all that is wanted for launching or beaching this craft. To withstand the severe knocking from the surf the boats used in conjunction with certain types of net, near the coast are built of planks which are sown together with rattan or coir. Ribs and frames are absent and even nails are not used in their construction. In some of the maritime states experiments are on hand to design suitable mechanised surf landing boats. Catamaran logs imported from Ceylon have been found to be cheaper and last longer than the indigenous variety available in Malabar.

Boats.—The popular boats in use are the non-rigid ‘masula’ boats (see lower plate facing page 13) which are constructed with planks without frame or ribs so as to withstand the severe knocking from the surf. Some of them are quite large, ranging from 26 to 35 ft. in length, 5 to 8 ft. in breadth and $3\frac{1}{2}$ ft. in depth and accommodate a crew of about 20. The usual size, however, is 15 feet by 3 feet, intended for crew of about 2. In Baruva in Visakhapatnam district, catamarans are provided with a plank on each side to a height of about 9 inches and serve as boats.

Boat-catamaran.—The “boat catamaran” is a large catamaran composed of three logs semi-permanently secured together by cross-pieces at either end in such a way that the side logs rise higher than the upper surface of the central one. Thus a longitudinal hollow is formed similar to the cavity in the boats. This craft is seen only between Punnaikayal and the cape Comorin.

(b) *River-craft.*—(i) *Rafts and dug outs.*—There is wide diversity in the materials utilised in the construction of rafts and dug-outs. Inflated skins, plantain stems and bundles of *shola* sticks tied together and forming crazy platforms, and inverted earthenware pots laced together in a bamboo framework, are the types commonly met with. Crafts of inflated skins are generally found in the upper reaches of the large rivers. The skins used are generally of buffalo turned inside out. Rafts of plantain stems or *shola* bundles are generally found in the marshy districts of the low lands or for fishing in tanks, ‘*jhils*’ and other quiet waters e.g., in West Bengal and Tanjore district in South India.

The “*Chatty*” or earthen pot raft is seen in Patna, Gaya and Hazaribagh. It is constructed usually of 9 earthen pots arranged in rows of three. Connecting bamboos lashed on either side of the mouths of these pots support a light platform of bamboo, the mouth of each

pot being closed with a cover of 'sal' leaves. An identical 'chatty' raft is in use in South India in the districts of Tiruchirapalli and Tanjore. Single pots are also used, the person sitting astride in the pot. The circular and bigger coracle is much in use in South India in the Cauvery and the Tungabhadra. The usual type is a shallow cylindrical frame of wickered work about five feet in diameter, over one mouth and the sides of which a cow hide is stretched and firmly tied. Very similar to the coracle is the 'tigari' or 'gamla' used in West Bengal. Dug-out canoes called 'Donga' in West Bengal and *ekhta* in Bihar are also very common on the shallow tributaries of the Ganga and other rivers. These are made from the lower ends of the stem of the palmyra palm.

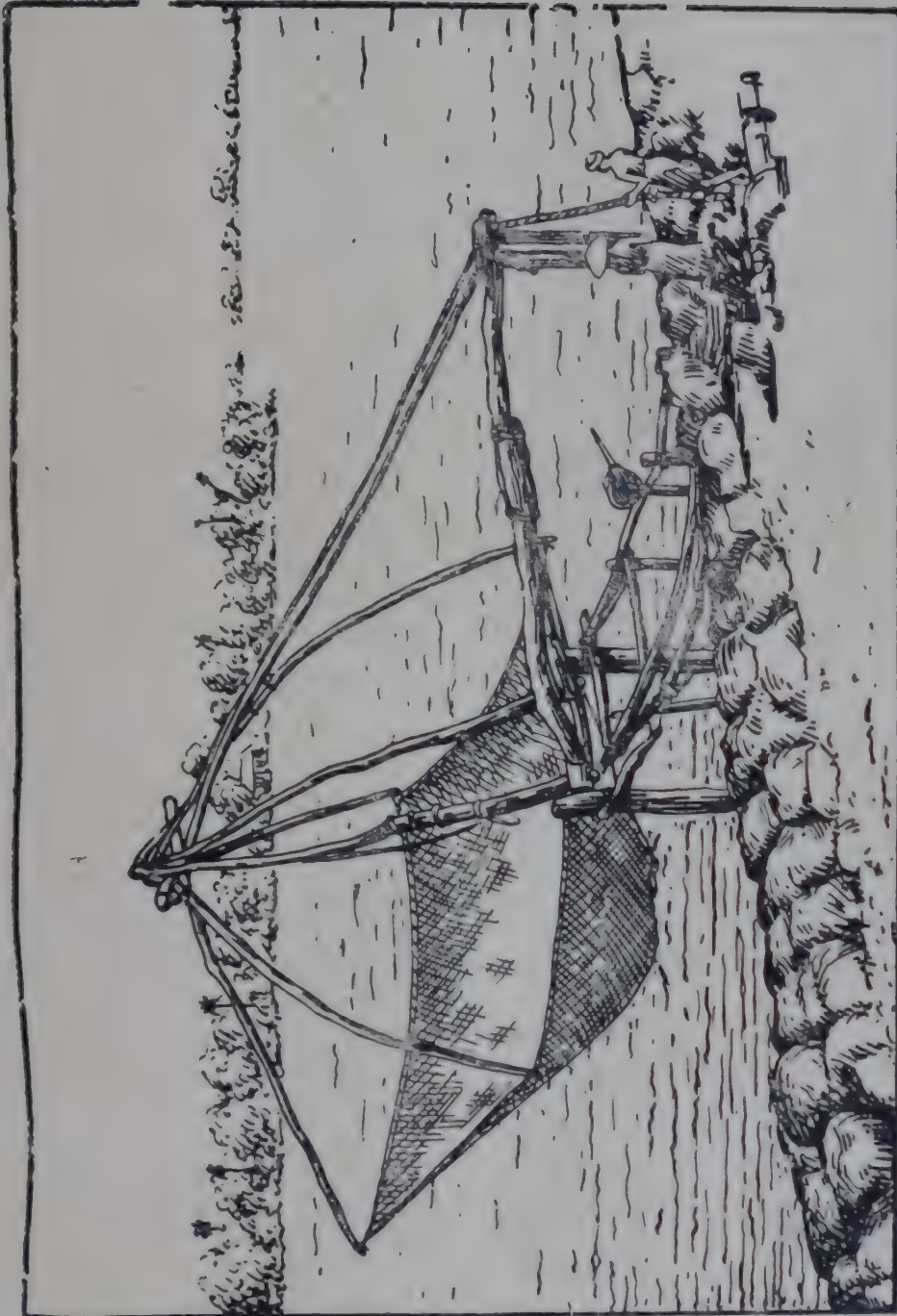
(ii) *Plank-built boats*.—There are various types of these boats. Certain types exclusively used for fishing are described below :—

Small riverine crafts are called 'dinghis'. Those used for fishing are known widely as "*jalia dinghi*" to distinguish them from small boats used for transporting goods or passengers. The commonest '*jalia dinghi*' is the one employed in the hilsa fishery in conjunction with the clap net called '*sangla*'. It is 15 to 25 feet long and from 3 to 4 feet wide. The '*jalia dinghi*' used with triangular dip net called '*bhesal jal*' is also very similar.

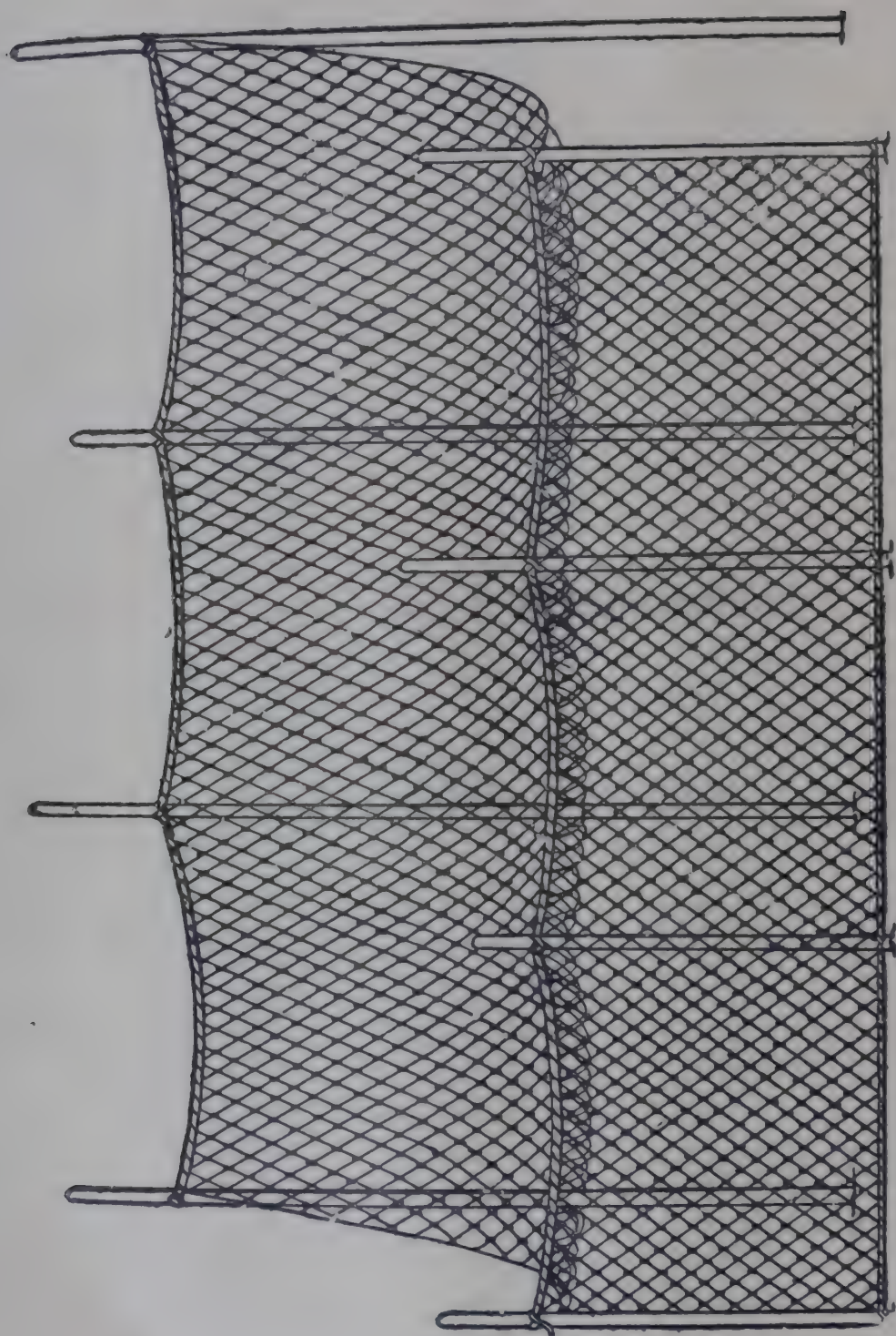
When rapid transport is needed, e.g., to take the catch from the large fisheries of the Sunderbans to the centres of demand, a narrow boat propelled by numerous rowers is used. The fish carrier '*chhip*' is a typical example (see upper plate facing page 15).

(iii) *Large fishing boats*.—Of these, the 'chhandi' is a good example. It is used in drift-net fishing in the lower and wider reaches of the deltaic rivers. It seldom carries a sail, being propelled by two or more rowers in the bows. The largest size is 60 feet in length and 10 feet in width.

Medium sized boats are more common and these have the following dimensions, length 34 to 36 ft. beam 5 to 5½ feet and depth about 2 feet. The 'chhandi' is partially decked, a few feet at each end being closed in with planking. The rest of the boat is covered with a temporary decking of split bamboos readily removable. Another type of large fishing boat is the 'bachari' used for fishing with a big cast net of the same name. It is longer but narrower than the 'chhandi' boat. Another interesting boat is the 'mechho bachari' used for the transport of 'live' fish. These boats are from 30 to 50 feet in length and the greater part of the hold is partitioned off to form a live well in which fish are transported in water.



CHINESE BALANCED DIP NET USED IN THE COCHIN BACK-WATERS.



KATTU VALA, A HIGHLY SPECIALISED FORM OF STATIONARY NET, USED IN THE COROMANDEL BACK-WATERS.

(2) NUMBER AND DISTRIBUTION OF FISHING VESSELS

The following table gives the approximate number of vessels used for sea fishing in India:—

TABLE NO. 2

Number of vessels used for sea fishing in India (1959)

State	Boats Plank-built and Masula	Canoes	Cata- marans	Total
West Bengal	55	..	..	55
Orissa	908	..	1,929	2,837
Andhra	3,165	..	17,001	20,166
Madras	3,422	824	22,217	26,463
Kerala	8,237	3,792	6,534	18,563
Mysore	3,091	3,449	..	6,540
Bombay	5,420	4,782	..	10,202
Kutch	306	..	..	306
TOTAL	24,604	12,847	47,681	85,132

Note.—Figures for Bombay include power propelled boats.

Source: Central Marine Fisheries Research Station, Mandapam camp.

It will be seen from the above table that the catamarans constitute the largest number of sea-fishing crafts.

B—Fishing implements (tackle)

Implements used for catching fish are very numerous, but all of them are variations of a few broad types. The chief fishing implements used can be classified as under :

- (a) Fixed or stationary nets (*see* plates facing pages 16 and 17).
- (b) Bag nets and purse nets (*see* plate facing page 20).
- (c) *Seine* nets (*see* plate facing page 18).
- (d) Drift and gilling nets (*see* lower plate facing page 15).
- (e) In-shore drag nets.
- (f) Cast nets (*see* plate facing page 19).
- (g) Scoop nets.

- (h) "Pouch" traps.
- (i) Trawl-type nets.
- (j) Long lines.
- (k) Miscellaneous appliances, e.g., fish spears, harpoons, fish screens, traps, baited springs, etc.

Large sized fishing implements are employed chiefly in sea fishing. In the backwaters, estuaries and in inland waters, however, traps, tidal operated screen barriers, cast-nets and large dip-nets are used. Drift nets are used only in the larger backwaters in the vicinity of seaward channels.

A classified list of the fishing gear used together with the local names of the nets and other implements, dimensions, brief descriptions of their modes of operation, etc., are given in the "Preliminary Guide to Indian fish, fisheries, methods of fishing and curing" on pages 72-135*. A summary showing the fishing implements used in the various areas along with their names in the local Indian languages will be found in Appendix III.

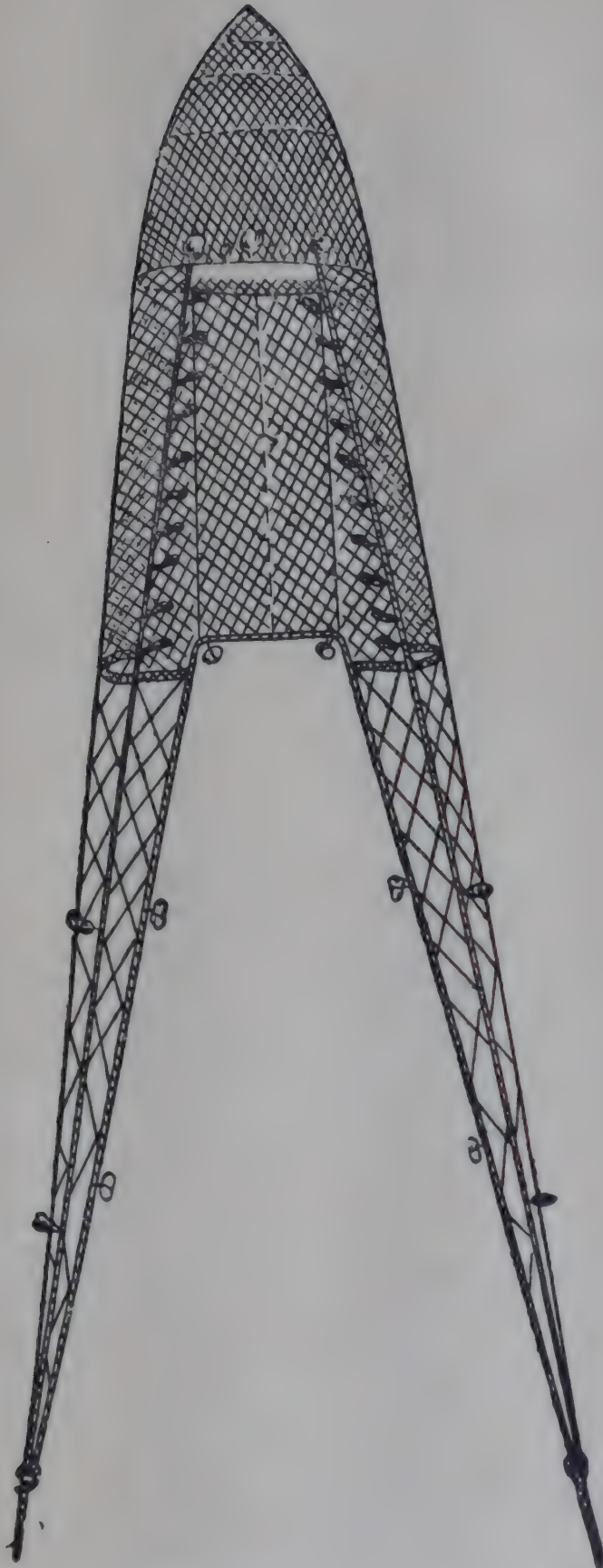
C—Note on the manufacture of nets and other fishing tackle

Light nets are made of ordinary cotton yarn available in the market. These are spun into thicker twines of 3, 4, 5 and 6 strands by means of the 'chadu' or 'takli', the common spinning instrument. The stronger but coarser nets are generally prepared with sann-hemp fibre (*Crotalaria juncea*). Nets are mostly made by the fisher-folks themselves during their leisure hours and off seasons.

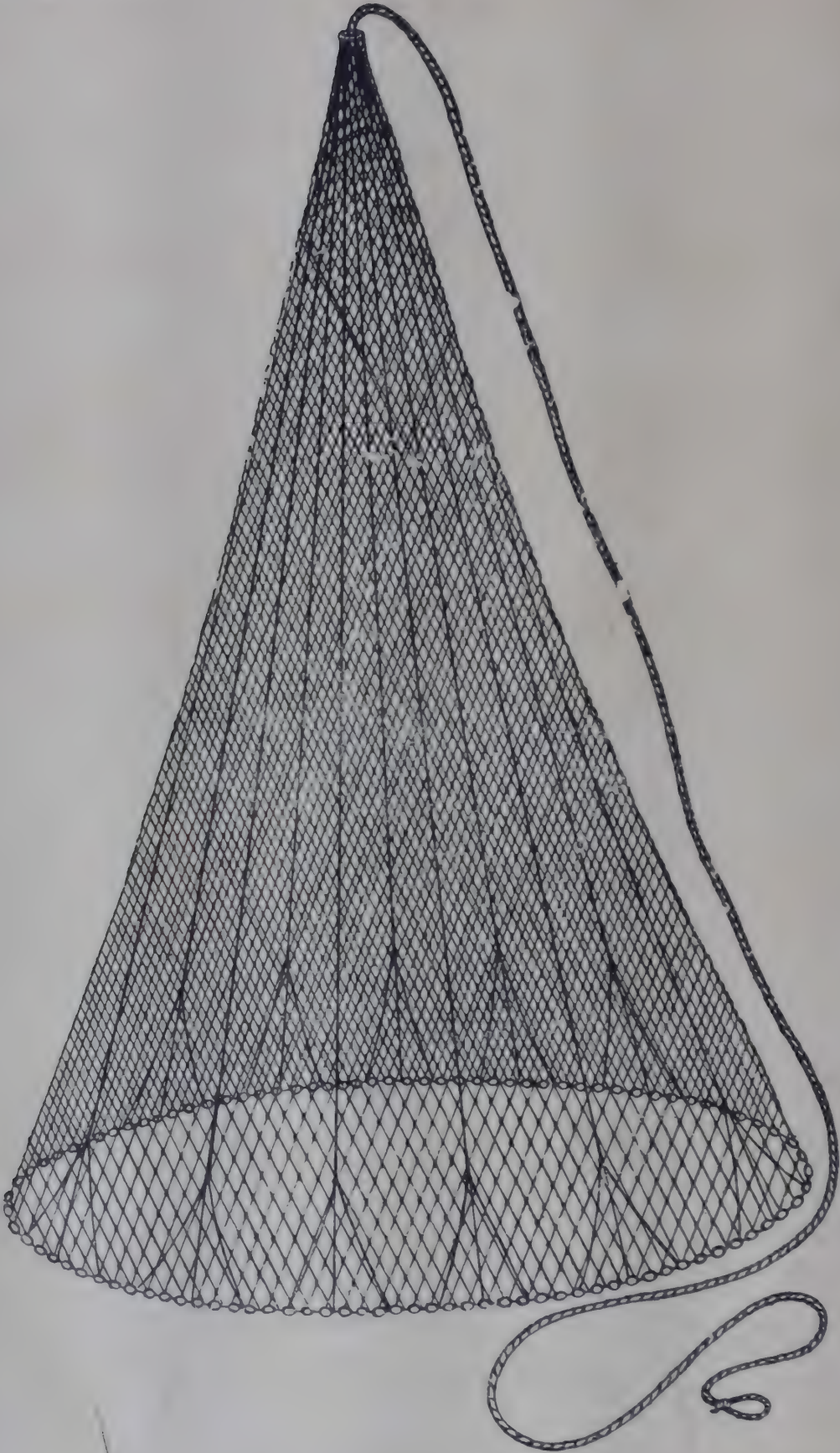
The nets are frequently "barked". The usual tanning materials employed are "Kalisam" or "odyan maram" (Odima wodier), 'Panachika' (fruit of *Diospyros embryopteris*) or the bark of karel (*Capparis aphylla*) wood. The bark (or the dried fruit) is finely ground and the tannin extracted by boiling it with water. When the resultant decoction is cool, the net is soaked in it for some time; after it has been dried on a scaffold, it is run through the decoction a second time. In West Bengal coal-tar is used for preserving fishing nets. Damaged sections of nets are replaced when necessary by new ones; it often happens that a net exists for an "indefinite" period, although several of its original sections may have perished and been replaced.

Long lines used in sea fishing are always made of cotton. These are tanned periodically. Indigenous hooks are employed with these lines. The hand-lines used in angling are made of sann-hemp fibre, the black fibre from old leaf—stalks of the palmyra and 'kitul' palm (*Caryota wrens*) trees and the fibres of *Calatrophis gigantea*. In West Bengal, waste silk is often used. Despite the care taken by fishermen, the average life of a light cotton net is rather limited being only one fishing season of nine months. Nets covered with blood, slime and fish oil, when stored wet, easily lose strength due to bacterial action as

*Marketing series No. 66, Obtainable from the Manager of Publications, Civil Lines, Delhi-8.



A BOAT SEINE, VAKKU VALA, USED IN THE MALABAR COAST.



A "STRINGED" CAST NET.

well as through heating on account of the oxidation of oil. The life of these nets could be considerably enhanced by sprinkling salt over them before they are piled, as is done in U. S. A. Blue vitriol (copper sulphate) alone or combined with soap and creosote is also largely used in other countries so that nets might retain their elasticity as well as lightness. Copper oleate also has been recommended by the United States Bureau of Fisheries as a highly efficient net preservative.

Nets made from nylon and terylene, the latest synthetic fibres in the market, are rapidly replacing the cotton nets in foreign countries. These are also being recommended for use in the east and west coasts of India.

Though these nets cost about four times that of cotton nets they have been found to last longer and do not require any preservatives to preserve them. In addition to the durability, they have very good resistance qualities against abraision. They are not affected by oil fumes either. Ready-made nets obtained from Japan and other countries are also being used in the mechanised fishing.

The above synthetic fibres have to be imported from foreign countries, which stand in the way of large scale introduction of these nets in the country. The total annual imports of these fibres allowed are of the value of about Rs. 20 lakhs. The manufacture of these fibres in India for which plans are afoot, would help large scale introduction of durable nets.

The Conference of State Ministers for Fisheries of maritime States held in 1957 had stated as follows in this connection :—

“Use of nylon as well as Italian hemp twine has been found to be very effective in certain fisheries and is conducive to increase production. There is no indigenous product to replace these materials. It is recommended, therefore, that the restriction on import of these articles may be liberalised and necessary licences granted on the basis of recommendations of the State Fisheries Departments.

Synthetic fibre such as nylon, terylene, etc., have proved to be very effective and durable in the capture of fish and these are being used on large scale in different parts of the world. Their utility has been unchallengeable. It is necessary, therefore, that steps be taken to promote manufacture of such material in India.

Italian hemp twine has also been found indispensable in capture of certain varieties of fish such as dara, etc., indigenous hemp has not been found suitable for the purpose. It is necessary, therefore, to promote research on curing and treatment of Indian hemp so as to bring the finished product to the level of Italian hemp twine. Necessary assistance in the manufacture of such product may also be given by the Government.

Nylon and hemp twine are subject to import duty of about 36½ per cent and 31½ per cent respectively, making the material expensive

for the fishermen. It is necessary, therefore, that subsidy on these articles may be continued as at present till indigenous products are freely available in the country.

D—Fishing with power boats

(1) FISHING WITH POWER BOATS IN FOREIGN COUNTRIES

The most important development with regard to sea fishing in foreign countries during the last century has been the application of power to the fishing craft. The rapid increase in the demand for fresh fish and the inadequate catches made by the traditional sailing crafts operating close to the shore stimulated the development in this regard. In Great Britain there has been development of the steam trawler and steam drifter. Power boats have not, however, entirely displaced the small sailing craft in Britain even today. Wherever coal is expensive, or the fishing grounds are close by, small sailing crafts still hold the field. Power is also used for dragging the heavy net along the bottom of the sea and for hauling the nets. In drifting and in seine net fishing*, power is required mainly for propulsion.

Most of the fishing vessels are equipped primarily to deal with one type of fishing. The type of fishing gear employed depends upon the kind of fish sought. Trawling is the chief method employed for bottom feeding "white fish" like cod, haddock, plaice, dab, etc. These constitute nearly 3/5 of the fish landed in Britain and hence the large number of steam trawlers are in use in the British waters.

Catching technique is now making rapid advances. Most of the large fishing vessels in Britain and Norway are fitted with echo sounders. Apart from its value as a navigation aid the recording echo sounder has become a standard method of finding and estimating the depth of shoals of fish such as herring. Time wasted in searching for fish is thus reduced, and with it the costs of production.

Other methods in vogue for locating shoals are (a) "Asdic" (echo-sounding which can obtain horizontal bearings), (b) radio equipped light wt. craft commonly used in the American tuna fishery and (c) Helicopters which have been found to be expensive.

Another device not yet in use on commercial scale is 'Electro fishing', or the use of electricity charged plates or cables to direct fish towards a net or tunnel, has been tried experimentally in fresh water in several countries and in sea water by Russia. The economic value of this method is still open to doubt.

(2) USE OF TRAWLERS IN INDIA

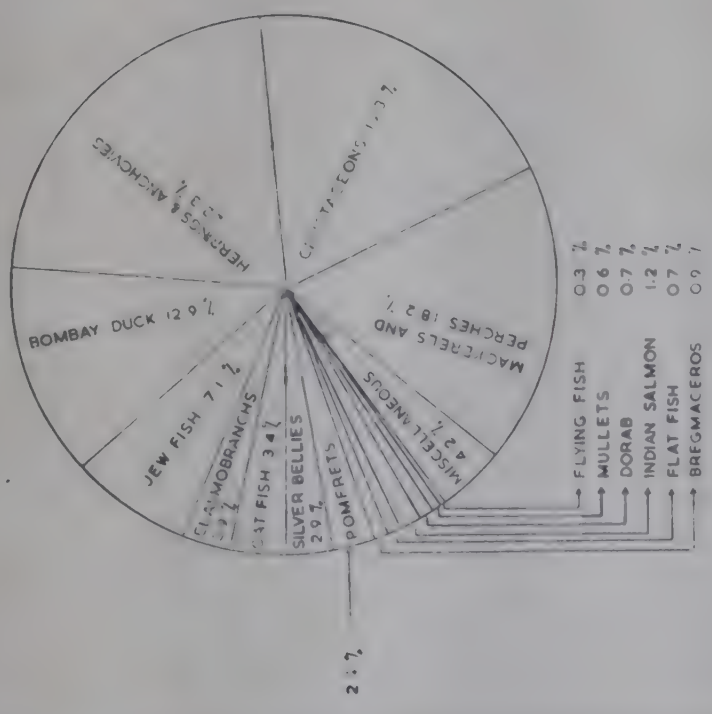
As stated previously trawler fishing has become popular in other countries, especially in Britain. The world's largest trawler "fairtry" 245 ft. in length and weighing 2,605 tons made its first voyage in 1954.

*The shoal of fish is gradually encircled with a net in the centre of which there is a bag like that of the trawl.

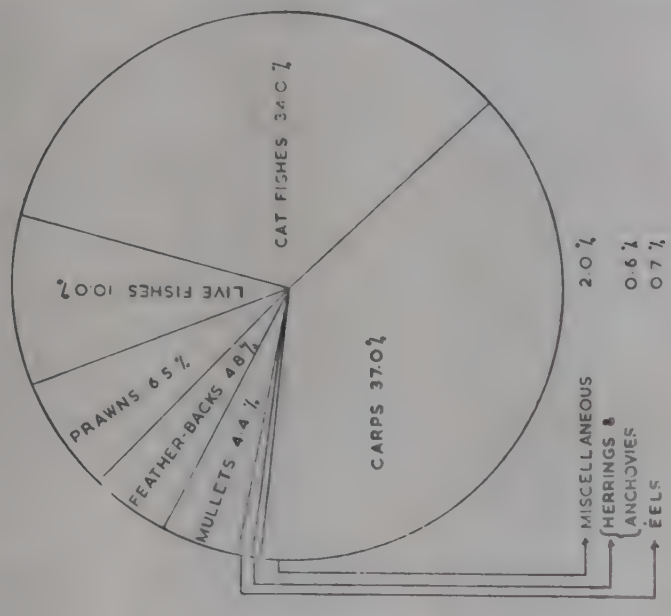
INDIAN FISH PRODUCTION CLASSIFIED ACCORDING TO COMMERCIALLY IMPORTANT GROUPS.

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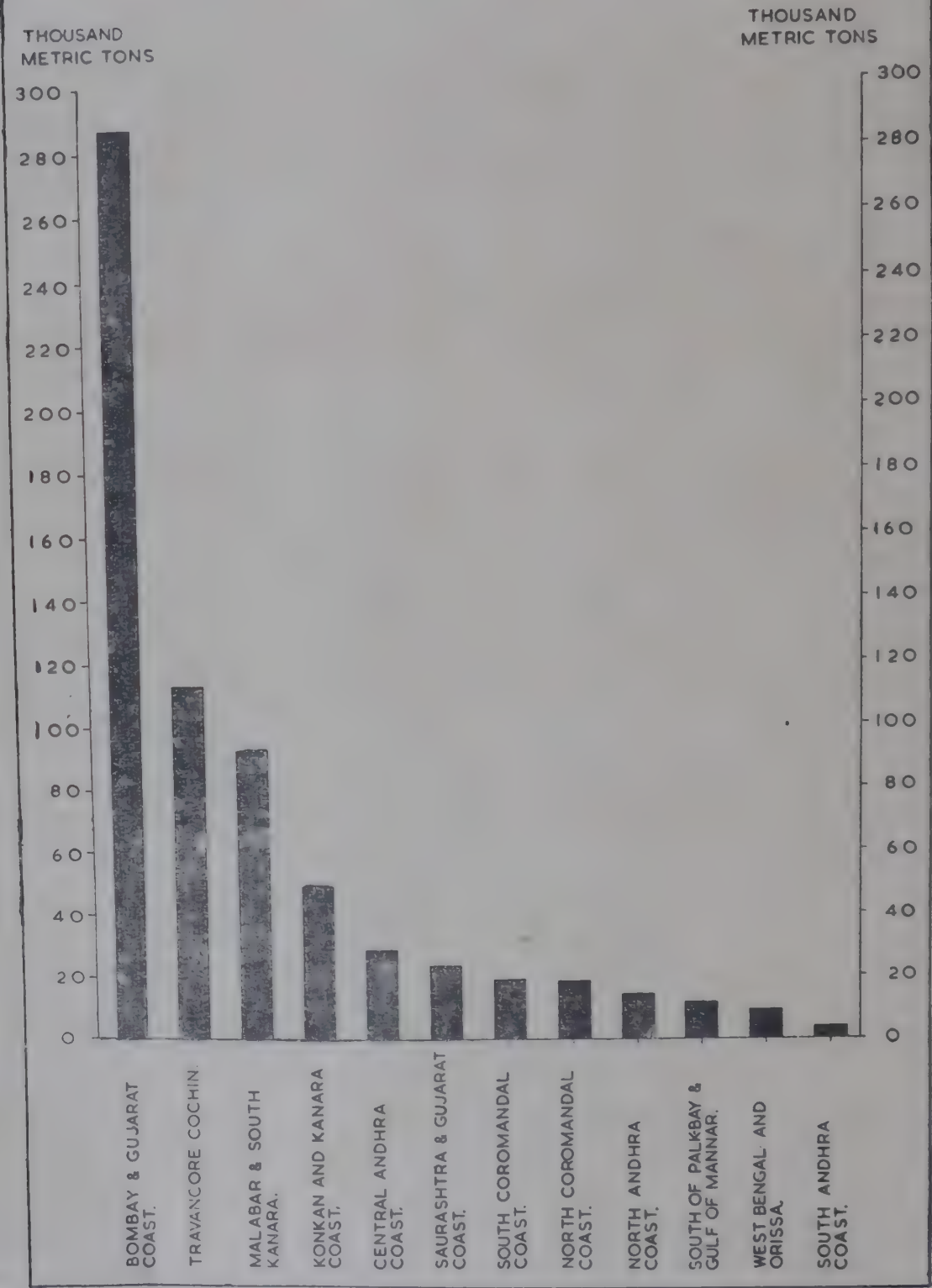
SEA - FISH



FRESH-FISH



LANDINGS OF SEA-FISH ACCORDING TO FISHING ZONES.



It can stay for three months in sea, hold 550 tons of fillets (1100 to 1200 tons of fish) and 110 tons of fish meal. The ship has a factory deck which includes a heading machine and skinning and filleting machine, two sets of quick freezers and conveyer system carrying fish to the fully refrigerated holds. There is a fish meal plant and a cod-liver oil plant. Handling of fish by hand is largely avoided. The fillets, some of them already in consumer size packages, are landed in a really fresh condition, and kept at low temperatures until they reach the consumer.

Fishing in the Indian seas is at present largely confined to a coastal belt of about 7-10 miles in width and thus the bulk of the marine fish landings are from in-shore waters. The indigenous crafts and tackle employed by Indian fishermen, though well suited for fishing in these areas, do not meet the needs of fishing in distant and deeper waters.

Before introducing extensive deep sea fishing methods with improved types of gear, it is essential that accurate data regarding the nature of the fishing grounds, their potentialities and the suitability of the gear contemplated for general adoption need be collected. Where fishing is seasonal, the suitability of the gear to the different fishing grounds and to different seasons has also to be tested.

Experimental trawling was commenced in the Indian seas as far back as in 1902. The fishing surveys then conducted by State Governments of Bombay, Bengal and Madras in the Arabian Sea, Bay of Bengal and Indian Ocean respectively, are of particular interest in view of the exploratory nature under exceptional and unfamiliar condition with practically no background knowledge and data available on the fishing banks and fishing conditions. The vessels generally proved to be commercially unsuccessful due to the high cost of maintenance, lack of adequate knowledge of fishing grounds, lack of trained personnel, etc.

In 1948, a Pilot deep sea fishing station was established at Bombay with the object of charting fishing grounds, determining fishing intensities, etc.

S. T. Meena 153' 5" in length with a tonnage of 426·6 explored and chartered an area of 7,500 sq. miles of fishing grounds on the north-west coast off Bombay in 18 months. The catches were found to be better than those trawlers working in the North Sea, Bay of Biscay and Portugal. In the operation of this vessel much experience was gained in the organisation of power fishing.

In 1949, two trawlers—M. T. 'Pratap' and M. T. 'Ashok' undertook charting and exploratory work in bottom fishing and completed charting of 17,000 sq. miles off the coasts of Saurashtra and Bombay within 40 fathom line. The catches by these two cutters during their exploratory fishing from 1949-50 to 1952-53 were 436·25 tons and 337·40 tons respectively.

In the year 1953-54, the two cutters 'Ashok' and 'Pratap' were converted for Bull-trawling (paired trawling from two boats) under the guidance of Japanese technicians. The results of fishing operations during two seasons showed that Bull-trawling yielded better results than other trawling in the same ground. A comparative study of the two types of operations, *i.e.*, otter-trawling by 'Taiys Maru No. 17' and Bull-trawling by the two cutters on the basis of the catch per hour of fishing and the quantity and percentage of commercially valuable fish caught, showed that the catch per hour in the case of cutters was, nearly 2 to 2½ times that of other trawling by 'Taiys Maru'.

These exploratory trials indicated that the yield of fish from Indian waters compared very favourably with that of some of the richest fishing grounds in the European waters and that there are some really rich grounds off the Saurashtra coast and good potentialities for trawling in those regions. Under the Second Five Year Plan, it was proposed to expand the activities of the deep sea fishing stations, Bombay and establish off shore fishing stations at Cochin on the West coast and the Tuticorin and Visakhapatnam on the East coast. All the power fishing vessels procured under T.C.M. Programme are being pooled for operation from the four centres.

The off shore fishing station at Cochin was established in February 1957 by moving the two cutters 'Ashok' and 'Pratap' and the Shrimp-trawler Durga. Recently this fleet has been strengthened. The programme of exploratory and experimental fishing at Cochin has been closely co-ordinated with work of the fishing schooners of the Indo-Norwegian project.

The off shore fishing unit at Tuticorin commenced functioning in June 1958 under the Government of India. The fleet will be strengthened by transferring some of the power fishing vessels from the west coast.

A Japanese firm undertook commercial fishing with a trawler Taiys Maru No. 17 from the year 1951 to 1954.

The Government of West Bengal have established a deep sea fishing station at Calcutta in collaboration with the Central Government for exploratory fishing in Bay of Bengal. Some rich grounds have been located at the head of the Bay and also at the mouth of the river Mahanadi.

In the maritime areas of Saurashtra, Travancore-Cochin and Madras, Shrimp-trawling, purse seining and other methods of fishing are being tried from some of the fishing vessels provided under the Indo-American Aid Programmes. As a result of the experimental fishing undertaken on the North-west coast of India particularly in the regions of the coast of Saurashtra, a firm called New India Fisheries Co. started functioning with the collaboration of the Japanese firm "Taiyo Fishery Co." The Japanese firm provided the fishing vessels, equipments, fishing personnel, etc. This venture has been successful as is evident by the profits earned from the time of its inception.

To encourage Indian Industrialists to set up similar fishing companies with foreign collaboration, the Government of India had drawn up a schedule of conditions in 1958 which could be seen at Appendix IV.

Two harbour specialists from the F. A. O. have been conducting a survey in the maritime States with a view to recommend suitable localities for developing small scale fishing harbours.

(3) POSSIBILITIES OF BETTER OFF-SHORE FISHING USING POWER

For increasing fish landings in the off-shore waters, mechanisation of fishing craft and fishing methods is being introduced in recent years in a number of maritime States. Motors are being installed in the existing boats or in improved types of boats. With the help of the motor boats the fishermen can reach the distant fishing grounds quickly and spend more hours in fishing and thus increase their daily catch.

Some of the existing boats are well suited for mechanisation as they are. But most types have to be modified in order to take full advantage of engine propulsion. The greatest problem for the Maritime State Fisheries Departments with regard to mechanisation is to determine whether the existing boats should be mechanised with a somewhat low efficiency or whether they should be discarded in favour of highly efficient boats of altered design which means much capital expenditure. Mr. P. B. Zeiner, F. A. O.'s Naval Architect assigned to India recently had observed "The fact that about 35 widely different types of local boats are suitable for motorization shows the magnitude and complexity of the project. Due to varied local conditions each State Government has to face problem of its own and no two States in the country have identical boating problems. This is the main reason why mechanisation of the Indian fishing fleet as a nation wide scheme offers little scope for co-ordinated efforts and standardisation."

In Bombay State over 1,200 fishing boats have been mechanised till 1957-58. Most of the boats on Bombay coast have been found to be sturdy and suitable for fitting engines varying from 25 to 35 H.P. The "machwas" and "lodhias" operating on the Saurashtra Coast have been found suitable for mechanisation. In Madras State most of the local fishing boats are not suitable for installation of engines. A new type of boat "Pablo boat" named after its designer, designed by an F. A. O. Naval Architect was built in 1954. These boats 25 ft. or 30 ft. in length are fitted with 10 or 20 H.P., diesel engines and net winch. The Madras Government has programmed to build 50 'Pablo' boats and distribute to fishermen through fishermen co-operatives on hire purchase system. Experiments are also being conducted to design a suitable surf landing boat for the surf beaten Madras Coast in place of the Catamarans.

In Andhra Pradesh the Kakinada and Masulipatam types of boats have been found to be suitable for mechanisation. The development of mechanised fishing in the immediate future in Andhra Pradesh may depend on the motorisation of the Masulipatam and Kakinada 'Navas'

In Orissa State fish carrier launches with insulated fish hold have been introduced in Chilka lake. Out board power boats for reservoir and creek fishing and 'dan' boats for multi purpose fishing are also being introduced.

In West Bengal the possibility of mechanising the local types of boats such as 'Batchari', 'Chot' and 'Diamond Harbour' boats are under consideration.

Training centres have been established at Veraval and Versova in Bombay State, Mangalore in Mysore State, Cochin, Beypore and Quilon in Kerala State, Tuticorin, Nagapatnam and Madras in Madras State, Kakinada in Andhra Pradesh to train fishermen in handling mechanised boats. A small stipend is paid to the fishermen during the training which extends to about six months.

It will thus be seen that the mechanised fishing vessels in our country have increased in recent years and this is likely to increase the landings of fish. These vessels are, at present, governed by rules and regulations of the Indian Merchant Shipping Act, 1923, some of which seriously handicaps the development of powered-fishing industry. As for example, heavy charges are levied on the fishing vessels as wharfage and port duties, which are laid down for large ocean-going vessels. The Indian Merchant Shipping Act does not prescribe specific rules for fishing vessels and, therefore it was found necessary to draft separate rules taking into consideration, the special needs of fishing vessels. The Government of India set up an *ad hoc* fisheries enquiry committee in 1958 for enquiring into and assessing the difficulties of the fishing industry in relation to the existing rules and regulations applicable to the motorised fishing vessels and formulating specific rules for fishing vessels and the committee has made certain recommendations* which are under the consideration of the Government of India.

The question of mechanisation of indigenous fishing crafts was also discussed in the Conference of State Ministers for Fisheries and the observations made therein are reproduced below :—

It has been found that mechanisation of indigenous craft leads to increased production of fish. The scheme of mechanisation has been included as a G. M. F. Scheme. However, full implementation of the Scheme is not possible because of restrictions on imports. The Conference is, therefore, of the opinion that as soon as the foreign exchange position eases, highest priority may be given to import of engines and spare parts meant for mechanisation of fishing craft and the existing restrictions be also liberalised in view of the present shortage of food material in the country.

Advantages of mechanisation are being appreciated by the fishermen in different States as a result of propaganda and persuasion by State Governments and the fishermen seem to be inclined to mechanise

*Report of Fishery Enquiry Committee published by the Ministry of Food & Agriculture, Government of India, 1959.

their boats on a scale larger than expected previously. It is, therefore, found that the allotments assigned for this scheme in the Five Year Plans of the States are limited and the acceleration of mechanisation is considered essential. It is recommended, therefore, that the savings in the Central plan for development of fisheries may be used from one minor head to another within the broad head of agriculture. Planning Commission may be requested to make this adjustment to meet the demand for supplementary food material which can be procured as a result of implementation of the schemes.

In view of the difficulties in importing engines from abroad due to shortage of foreign exchange, it is recommended that indigenous firms may be assisted by Government in the manufacture of dependable engines of suitable horse power for the fishing trade.

Suitability of fishing vessels for installation of engines is a matter of considerable importance in the scheme for mechanisation of indigenous craft. As boats of unsuitable designs require more power and lead to waste of fuel energy and increase recurring expenditure, it is recommended that attention be paid to the suitability of designs of vessels so as to improve their durability as well as efficiency from the operation point of view. Encouragement may also be given to establish fishing boat building yards on subsidised basis wherever co-operative societies are willing to take up this work.

With the progress of mechanisation proper facilities for training in maintenance, handling and repairs to engines are also essential. It is, therefore, recommended that necessary facilities may be provided in different States with stipendiary allowances so as to attract the fishermen to undertake the training. Candidates trained in these centres may also be held eligible to appear directly for competency certificate examinations held by the Merchantile Marine Department as drivers and operators on mechanised vessels.

Oils used for the engines on fishing boats is at present subjected to heavy Excise duty of 60 nP. per gallon raising the cost from Rupee one per gallon to Rs. 1.60 per gallon. This recent tax increases the cost of production and seriously affects the economy of fishermen who have mechanised their boats. It is recommended, therefore, that in the opinion of this Conference, the fishing trade which has just started to develop on modern lines be exempt from payment of such duties or in the alternative subsidies equivalent to the aforesaid taxes be given by the Governments concerned when the material is sold through co-operative societies. A resolution adopted to the same effect in the All India Fisheries Conference in September, 1956 at Madras may also be taken into consideration by Government.

CHAPTER III—SUPPLY

A—World production

The table given below, gives the world catch of fish by continents during the quinquennium ending 1957.

TABLE No. 3
World catch of fish (Million Metric tons)

Continents	1953	1954	1955	1956	1957	Ave- rage	Perce- ntage
Africa	1.60	1.60	1.66	1.77	1.86	1.70	6.1
America North	3.54	3.91	3.89	4.26	3.94	3.91	14.0
America South	0.56	0.63	0.77	0.82	0.97	0.75	2.7
Asia	10.10	10.78	11.57	11.93	12.88	11.45	41.1
Europe	7.02	7.51	7.62	8.08	7.64	7.57	27.2
Oceania	0.11	0.11	0.11	0.12	0.13	0.12	0.4
U.S.S.R.	1.98	2.26	2.50	2.62	2.54	2.38	8.5
World Total	24.91	26.80	28.12	29.60	29.96	27.88	100.0

Source.—F.A.O.'s Year Book of Fishery Statistics, Vol. VII 1957.

On an average about 27.88 million metric tons of fish are caught throughout the world. The continents of Asia, Europe, North America and the U.S.S.R. put together contribute nearly 91 per cent of the total catches, while the balance of 9 per cent is accounted for by Africa, South America and Oceania. Asia is, however, by far the largest single continent contributing over 41 per cent (11.45 million metric tons) of the world catches.

The most important fishing countries in Asia are Japan and China followed by India having 42.1, 17.8 and 8.3 per cent respectively of Asia's catches.

As will be seen from Appendix V giving the world catch by group of species nearly one fourth of the world catches (24.0 per cent) consist of the group "Herrings, sardines, anchovies". The group "cods, lakes, haddocks" comprise 15.8 per cent of the total catches and the share of the "freshwater fishes" is only 10.1 per cent of the world production.

B—Indian supplies—Annual landings of fish

(1) METHOD OF SURVEY

Fish statistics for the whole of India are not regularly collected and compiled. Collection of statistics is rendered difficult by the fact that the industry is scattered and is run on primitive lines. Along every line of the coast of India and in every river, tank, pond, etc. fishing goes on. The boats go out by night or day and the catches are often sold off to local purchasers immediately they are landed. The

fishermen have very little idea of weights, they speak either in terms of baskets (of varying sizes) or of divisions of boats (in the West coast) or of number. The multitude of names in the Indian languages for the same fish is another stumbling block.

Only in recent years, adequate attention is being paid to 'fisheries' especially in maritime States, and some States, notably Madras and Bombay have been collecting fish statistics with the help of subordinate staff stationed mainly in fish curing yards of the fisheries department but the other States do not have a statistical unit for the collection of 'fish' statistics. The Central Marine Research Station at Mandapam with their survey assistants along the east and west coasts conduct a sample survey and on the basis of data collected estimate the approximate total annual production of marine fish.

As per recommendations of the *Ad hoc* Fisheries Committee (1954) the fishing survey programme was expanded considerably in 1957-58 and the number of zones in the coast line of India was increased from 12 to 20. The jurisdiction of the survey was extended for the first time to Kutch (zone 20) from September 1957. As only preliminary surveys could be made in this region and as the data for the whole year were not available, no estimates of landings for this zone are included in this report.

The Central Inland Fisheries Research Stations have not as yet organised the collection of 'fish' statistics of fresh water fish on an All-India basis.

Various fisheries conferences held from time to time which have emphasized the need for reliable All-India fisheries statistics as an essential pre-requisite for proper development of fisheries. The recommendations of the last All-India Fisheries Conference (1956) are being reproduced below :—

- (1) steps be taken by the Directorate of N.S.S. to expedite development of suitable techniques for the estimation of catches, particularly for inland fisheries;
- (2) for bringing out the main features of the fisheries economy, the Directorate of N.S.S. undertake quinquennial socio-economic surveys;
- (3) the Directorate of Economics and Statistics in the Ministry of Food & Agriculture organise collection of regular data on Economic and Commercial Intelligence pertaining to fisheries and potential resources in the States;
- (4) the State Governments examine the possibility of licensing all fishing craft and gear (with nominal fees or without fees), as a means of obtaining fishery statistical information relating to potential resources;

Till the finalisation of the techniques by N.S.S. for the estimation of inland fish catch, the State Governments may endeavour to furnish approximate estimates of inland fish catches based on fishing units;

- (5) the existing Central and State Fishery Organisations continue and expand their activities for the collection of fishery statistics and data and new schemes for the collection of statistics be developed in areas not covered by existing work;
- (6) while States with adequate fishery organisation may utilise their for collection of data, other States may collect information through other departmental agencies or through village level workers in the N.E.S. blocks and Community Projects areas;
- (7) the Central and State Governments evolve suitable proforma for this purpose, lay down procedures and develop suitable yardsticks;
- (8) the collection of fisheries statistics in the States on a uniform basis be co-ordinated by the Central Ministry of Food & Agriculture. The Directorate of Economics and Statistics will be responsible for the publication and dissemination of statistical information on fisheries; and
- (9) the Resolution envisaged above may be implemented, as early as practicable, so as to ensure the availability of fishery statistics on an All-India Scale during Indo-Pacific Fisheries year 1957-58.

In this report, figures of the quantities of fish caught in the various areas are only estimates. These estimates have been made after taking into account (1) Central fisheries (Marine) statistics (2) fish curing yard figures (3) un-published and published fish statistics of different States (4) import of fresh fish into West Bengal from East Pakistan (5) import and export figures of preserved fish and fish-products given in the publications issued by the Director, Commercial Intelligence (6) Figures of movements of fish by rail and (7) figures of arrivals of fish in Municipal Markets, ports, etc. in the principal cities specially collected by the Directorate of Marketing and Inspection during the course of this survey and discussions with State authorities.

(2) PRODUCTION OF FISH

The total annual average production of fish in India (for the year 1953-57) has been estimated as follows :—

Particulars	Quantity in thousand metric tons
Sea fish (including fish caught in estuaries and back waters) . . .	671.0
Fresh water fish (excluding fish caught by non-professional fishermen).	180.0
	852.0

It will be observed that the sea yields more than $3\frac{1}{2}$ times of fish than fresh water sources.

*Marketed surplus estimated during 1956-57.

(a) *Sea-fish*.—The total annual production of sea-fish is given in Appendix VI for the years 1950 to 1957 and the zone-wise distribution for the same period is given in Appendix VII and average for the quinquennium ending 1957 is summarised in table No. 4 below :—

TABLE NO. 4

Zone-wise distribution of fish catch in India

Zone	Total catch in metric tons	Percentage to total
(a) <i>East coast</i> —		
1. West Bengal & Orissa	9,301	1·4
2. North Andhra Coast	14,338	2·1
3. Central Andhra Coast	28,345	4·2
4. South Andhra Coast	3,687	0·6
5. North Coromandel Coast	18,574	2·8
6. South Coromandel Coast	18,970	2·8
7. South of Palk Bay & G. of Mannar	11,646	1·7
Total for East Coast	104,861	15·6
(b) <i>West Coast</i> —		
8. Travancore Cochin	113,004	16·8
9. Malabar & South Kanara	92,436	13·8
10. Konkan & Kanara Coast	48,921	7·3
11. Bombay & Gujarat Coast	286,968	42·7
12. Saurashtra & Gujarat Coast	23,649	3·5
Total for West Coast	564,978	84·1
Mechanised vessels	2,073	0·3
GRAND TOTAL	671,912	100·0

It will be seen that the estimated production of sea-fish in the country is nearly 672 thousand metric tons annually. All the fishing grounds are not, however, equally productive. The length of coast-line of India along the West Coast is about 1,300 miles, but more than 84 per cent of the total catch is landed here, while the East Coast, although it stretches over nearly 1,620 miles, produced only the remaining 16 per cent. In the West Coast, Bombay and Gujarat Zone, having a length of coast-line of about 380 miles account for over 42 per cent of the Indian production, while in the East Coast, West Bengal and Orissa having about 500 miles of sea-coast account for only 1·4 per cent of the total catches. Owing to the peculiar physical features of the Coast-line of West Bengal—the area is a tangled region of estuaries, rivers and water courses and is uninhabited except during the calm weather—the marine fishery resources of West Bengal have been but slightly tapped.

(b) *Fresh-water fish*.—The actual yield of the fresh-water fish has not been estimated so far. The table No. 5 below therefore, shows only the estimated marketed surplus in the various States as obtained during the course of this survey. These estimates are based on the personal enquiries made in some of the markets of each State and, therefore, can give only a very rough idea.

TABLE NO. 5

Estimated marketed surplus of fresh-water fish

State	Catch available (in thousand metric tons)	Percentage to total
1. Madras	31·4	17·4
2. Kerala	4·1	2·3
3. Mysore	3·6	2·0
4. Bihar	37·3	20·6
5. Orissa	23·2	12·8
6. Assam	1·2	0·7
7. West Bengal	28·8	15·9
8. Punjab	0·4	0·2
9. Uttar Pradesh	6·6	3·7
10. Delhi	1·1	0·6
11. Himachal Pradesh	0·2	0·1
12. Bombay	0·8	0·5
13. Madhya Pradesh	3·5	1·9
14. Andhra Pradesh	36·6	20·2
15. Jammu & Kashmir	0·7	0·4
16. Other States*	1·3	0·7
TOTAL	180·8	100·0

*Tripura, Rajasthan and Manipur.

It will be observed from the table on previous page that Bihar is the leading State accounting for about 21 per cent of the catch available. This is closely followed by Andhra Pradesh with 20·2 per cent. The third State in order of importance is Madras accounting for 17·4 per cent while West Bengal having 15·9 per cent of the available catch stands fourth. Orissa with 12·8 per cent is also an important State for the fresh-water fish. The other States are comparatively of minor importance in the availability of the fresh-water fish.

(3) CLASSIFICATION OF INDIAN FISH

Although more than 1,800 distinct species of fish are known to exist in Indian waters, the varieties that are caught in appreciable quantities are limited in number. As explained in the chapter on "Types of Fishes" these commercially important varieties can be classified further into 15 groups in the case of sea-fish and eight in the case of fresh-water fish.

(a) *Sea-fish*.—The following abstract of Appendix VI based on the classification referred to above shows the estimates of fish-products according to the main groups. This is further illustrated in the diagram facing page 21.

TABLE NO. 6

Estimated catch of sea-fish according to groups

Name of group	Estimated catch average for the quinquennium ending 1957 (Metric Tons)	Percentage to total
1. Mackerels & Perches	122,475	18·2
2. Crustaceans	129,580	19·3
3. Herrings & Anchovies	149,669	22·3
4. Bombay Duck	86,804	12·9
5. Jew fish	47,688	7·1
6. Elasmobranchs	19,464	2·9
7. Cat-fish	22,876	3·4
8. Silver-bellies	19,231	2·9
9. Pomfret	16,347	2·4
10. Bregmaceros	5,991	0·9
11. Flat fish	4,976	0·7
12. Indian Salmon	7,780	1·2
13. Dorab	4,952	0·7
14. Mulletts	3,800	0·6
15. Flying fish	1,844	0·3
16. Miscellaneous	28,435	4·2
TOTAL	671,912	100·0

It will be observed that "Herrings & Anchovies" group constitute more than 22 per cent of the total catches closely followed by Crustaceans and "Mackerels & Perches". The Bombay duck group, however, comes fourth with nearly 13 per cent of the total catches. The other popular fish like Pomfrets and Indian Salmon are caught only in small quantities, the respective percentage being 2·4 and 1·2.

(b) *Fresh-water fish*.—The classification of the marketed surplus of fresh-water fish according to groups is shown in the following table:—

TABLE NO. 7

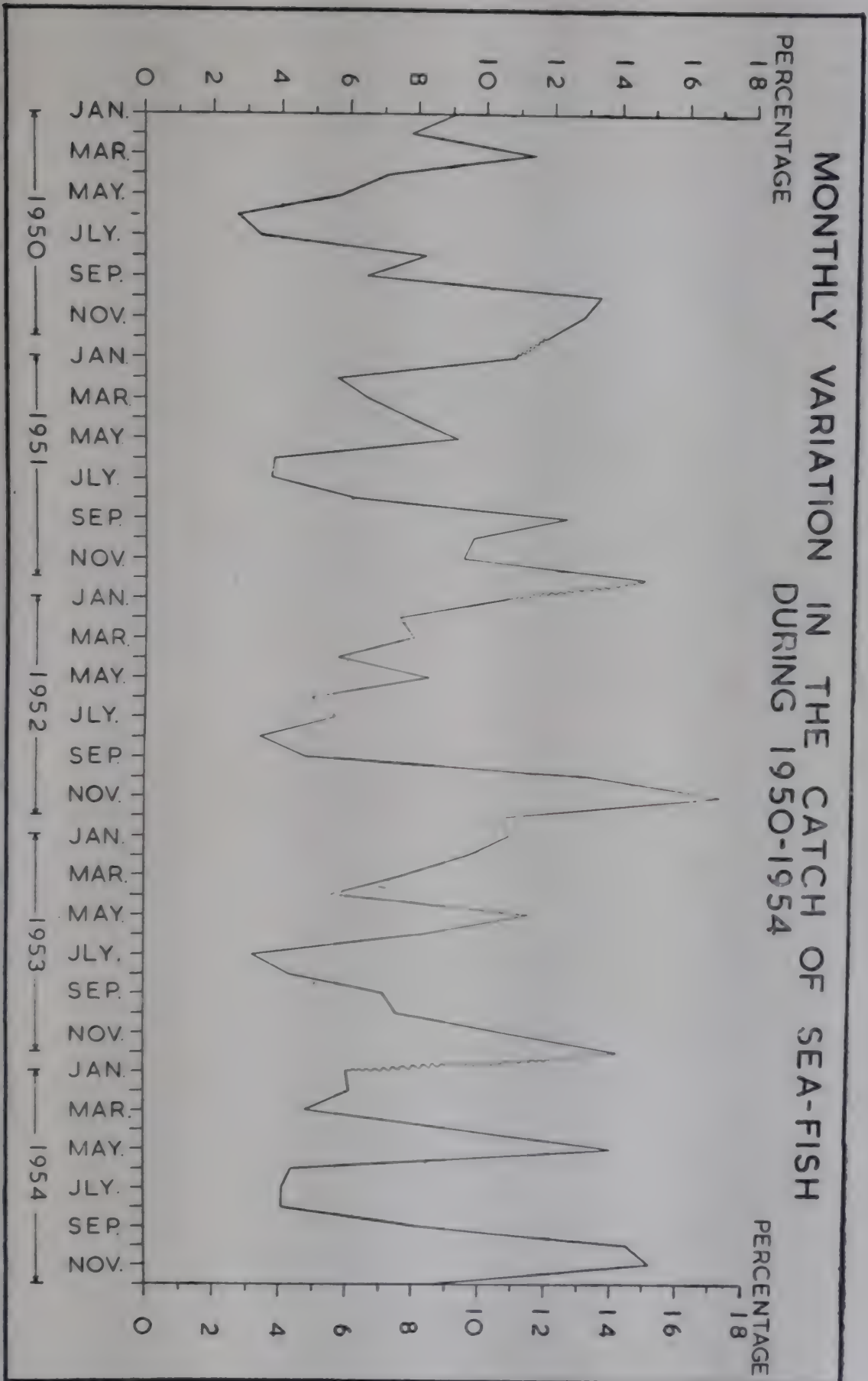
Classification of marketed surplus of fresh-water fish according to group

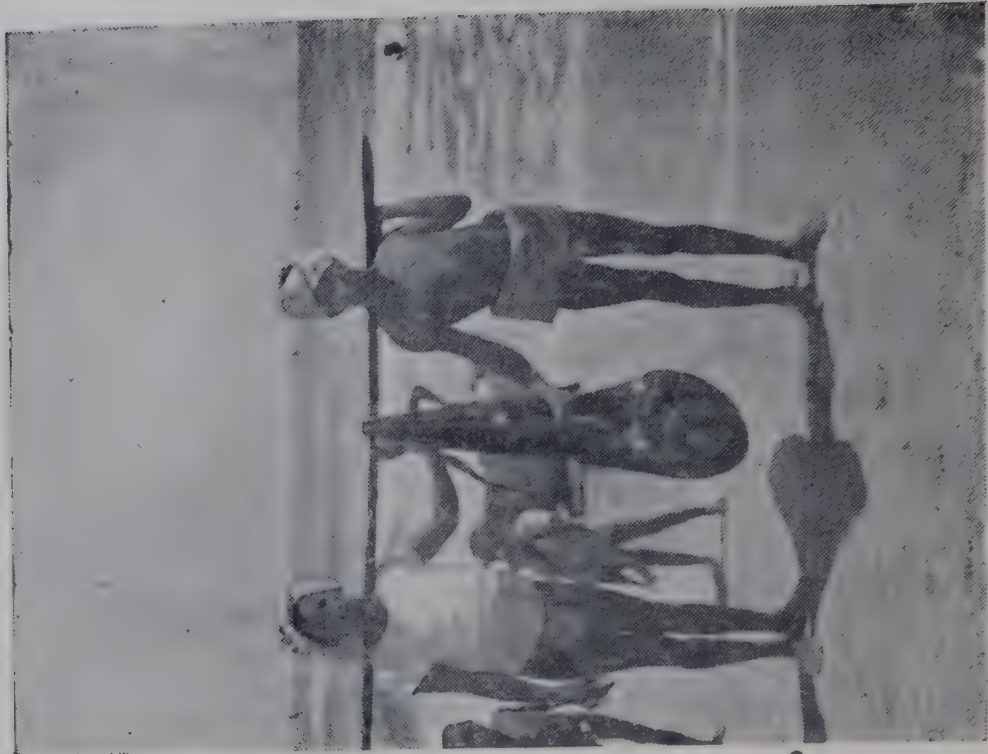
Name of the group	Estimated quantity available (thousand metric tons)	Percentage to total
1. Carps	66·9	37·0
2. Cat-fishes	61·5	34·0
3. "Live" fishes	18·1	10·0
4. Prawns	11·7	6·5
5. Feather-backs	8·7	4·8
6. Mulletts	7·9	4·4
7. Eels	1·3	0·7
8. Herrings & Anchovies	1·1	0·6
9. Miscellaneous	3·9	2·0
TOTAL	180·8	100·0

Carps constitute 37 per cent of the total fresh-water fish marketed in India closely followed by cat fish. These two groups put together account for 71 per cent of the available total, while live-fishes and prawns constitute 10 per cent and 6·5 per cent respectively to this total. This is further illustrated in the diagram facing page 21.

(4) CLASSIFICATION ACCORDING TO FISHING AREAS

Appendix VII shows the quantities of Sea-fish landed in the different coastal zones of India. The diagram facing page 21 indicates the position at a glance.





BRINGING THE CATCH ASHORE.



GUTTING A RAY.

(5) SEASONAL VARIATIONS IN PRODUCTION

In India fishing is a seasonal industry both with regard to sea and fresh water. During the monsoon months fishing is generally poor due to squally weather conditions in the sea and the increase in the flow and volume of water in the rivers and tanks. The only exception is the hilsa fishing which goes on even when rivers become swollen with flood water.

(a) *Sea fish*.—As already described in the Chapter on “Fishing gear and methods of fishing”, sea fishing in India is confined to the coastal waters and the fishing boats ply only when calm weather prevails.

On the West coast the fishing season starts more or less simultaneously at all fishing centres immediately after the cessation of the South-West monsoon generally in the end of September. The season reaches its peak in October-November. It is at its ebb in February from when onwards there is a progressive decline in the quantities landed.

On the east coast the conditions are slightly different because this portion of the coast line is not within the belt of the South-West monsoon. The catch is more or less uniformly spread throughout the year and during May and June when fishing is very poor on the west coast, appreciable quantities are caught here. The diagram facing page 32 and the following table No. 8 shows the seasonal distribution of total catch in the coastal regions of the country as a whole for the years 1950 to 1954.

TABLE NO. 8

Seasonal distribution of total catch (per cent)

	1950	1951	1952	1953	1954
Total Catch (Thousand Metric Tons)	580.0	533.9	528.3	581.5	588.3
January	9.1	10.9	10.8	10.8	6.0
February	7.8	5.6	7.5	9.5	6.1
March	11.4	6.5	7.9	7.6	4.8
April	7.1	7.8	5.7	5.5	9.9
May	5.7	9.2	8.4	11.4	13.9
June	2.7	3.8	4.9	8.1	4.4
July	3.4	3.7	5.6	3.1	4.1
August	8.2	6.1	3.4	4.3	4.1
September	6.5	12.5	4.8	7.1	8.1
October	13.4	9.7	13.2	7.5	14.5
November	12.9	9.4	17.1	11.0	15.2
December	11.8	14.8	10.7	14.1	8.9

It will be observed from the foregoing figures that the fourth quarter of the year (October-December) accounted for the highest catches. The poorest landings have been in the second quarter (April-June) during 1950 and 1951 and in the third quarter (July-September) during the subsequent years. Due to very heavy landings in Bombay zone during the months of April and May in 1954, there has been some departure from other years during the second quarter (April-June) of this year.

(b) *Fresh-water fish*.—The seasonal factor is quite pronounced in fresh-water fishing also but here the causes are somewhat different. In the large rivers of Northern India, there is generally not much fishing during the rains and the season begins in October when the water level subsides.

Tanks, on the other hand, are best fished when the water level is low. In Madras and Andhra Pradesh, the chief source of fresh-water fish supply is tanks and the largest quantities are caught during April to July.

In the Inland tracts generally speaking climatic conditions determine the supply and wide variations occur from State to State as will be seen from the following table No. 9.

TABLE NO. 9
Availability of fish in certain areas (per cent)
(Based on the data collected in 1956-57)

Month	Met- tur* (Mad- ras)	†Ra- jahmu- ndry (An- dhra Pra- desh	Hy- dera- bad (An- dhra Pra- desh)	Bihar ‡	U.P. ‡	Delhi ‡	Rajas- than ‡
January . . .	2.7	5.8	1.5	7.5	4.3	3.5	14.1
February . . .	1.6	6.4	1.5	5.0	3.6	2.2	13.5
March . . .	2.1	7.4	2.1	6.9	8.2	7.2	13.2
April . . .	11.2	12.2	37.5	8.2	9.2	14.2	15.4
May . . .	13.1	14.2	38.2	12.0	11.3	22.3	14.8
June . . .	12.1	7.8	4.7	11.9	17.1	22.0	12.1
July . . .	14.1	7.9	4.2	3.0	7.3	7.7	2.4
August . . .	11.2	9.1	3.8	1.9	4.0	6.1	..
September . . .	11.0	13.1	2.2	5.3	4.1	2.9	0.8
October . . .	9.0	5.6	1.6	22.8	16.6	4.1	5.0
November . . .	8.6	7.4	1.5	9.8	7.3	2.1	0.4
December . . .	3.3	3.1	1.2	5.7	7.0	5.7	8.3

*Based on Departmental catches from Stanley Reservoir.

†From fresh water Biological Station.

‡Based on movement figures to Calcutta.

(6) TREND OF PRODUCTION

Data in respect of marine catches for the country as a whole is only available from 1950 onwards (*vide* Appendix VI). A machinery has been set up at the Central Marine Fisheries Research Station for this purpose. According to these figures the total quantity landed during the years 1950 to 1957 was as follows :—

Year	(Metric Tons)	Percentage increase (+) or decrease (—) over 1950
1950	580,021	
1951	533,916	—8·0
1952	528,346	—8·9
1953	581,460	+0·2
1954	588,257	+1·4
1955	595,722	+2·7
1956	718,702	+23·9
1957	875,420	+50·9

The above figures reveal that the total catches have progressively increased from 1953 onwards. The increase has, however, been highest during 1957 when the catches went up by about 51 per cent over 1950 figures.

Wide variations occur from year to year in regard to landings of different species of fish.

The quantities of two important commercial varieties of fish *viz.* Sardines and Mackerels landed along the Kerala Coast is given below for a period of 15 years and gives an idea of fluctuations from year to year :—

Year	Total catch (000 Metric Tons)	Percentage increase (+) or decrease (—) over 1939-40
1939-40	50·4	
1940-41	56·0	+11·1
1941-42	36·7	—27·2
1942-43	110·9	+120·0
1943-44	48·4	—4·0
1944-45	60·7	+20·4
1945-46	123·4	+144·8
1946-47	98·2	+94·8
1947-48	34·2	—32·2
1948-49	30·6	—39·3
1949-50	43·5	—13·7
1950-51	96·8	+92·1
1951-52	154·3	+206·1
1952-53	44·3	—12·1
1953-54	107·2	+112·7

Variations in the quantities of fish landed from year to year are not peculiar to India. Such variations occur in other countries also. The Marine Fisheries Research Station have observed that the abundance of fish comprising a particular fishery depends on a variety of conditions which include the length of life of the fish, the age at which the fish become mature, the duration of spawning, areas, migratory habits and many other aspects including the amount of food available.

No production figures are, however, available in regard to fresh water fish which can illustrate the trend of production. While the proper conservation and increase in the fish populations of rivers, streams, tanks etc. is a long term project, attention is being focussed on pisci-culture on tanks, ponds and other enclosed areas of water in various States by stocking them with fry and fingerlings of carps, under the aegis of the "Grow More Food" campaign of the Government of India. These schemes aim at directly increasing production through stocking operation, reclamation of derelict tanks and swamps etc. indirectly increasing production and the availability of fish.

(7) FISH RETAINED BY FISHERMEN AND OTHERS FOR DOMESTIC CONSUMPTION

It is very difficult to determine with any degree of accuracy the amount of catch actually retained by the fishermen in the villages of any district or State.

Since there is a ready demand for fish in the urban areas, fishermen who operate near cities and towns retain very little of the catch for their own use. In the rural area, during the fishing season, many villagers take to fishing and the fish so caught are invariably used for home or domestic consumption.

The quantity retained by professional fishermen depends upon (1) the site of fishing (2) the size of the catch (3) varieties which constitute the catch (4) the existence or otherwise of a fish curing yard in the neighbourhood and (5) transport available.

While the marine fishermen catch fish within a short distance from their homesteads, fresh water fishermen have often to travel several miles along a river in search of fish. During such campaigns when parties of fishermen remain out for a number of days a fair proportion of the catch is used by them for their own consumption. When catches are large and plentiful generous gifts are often made to friends and acquaintances as well.

The nature of the catch is often a deciding factor. If the catch consists of seer, pomfrets, perches etc. in the case of sea fish and rohu, mrigal, catla etc. in fresh water fish, the fishermen generally set apart the whole of the catches for sale. When the catch is mixed the varieties

which are in demand in the market are separated and, out of the rest, small sized ones or coarse and bony varieties, are retained for consumption. If there is a fish curing yard in the neighbourhood, fish are cured there.

A rough estimate made of the quantity of fish retained by fishermen for their own consumption revealed that as regards sea-fish, out of a total production of 671·9 thousand metric tons, 47 thousand metric tons or 7 per cent was retained by producers. In the case of fresh water fish 180·8 thousand metric tons shown as being available represents the quantity that is actually offered for sale.

(8) IMPORTANT CENTRES WHERE FISH ARE LANDED OR ASSEMBLED

Owing to the scattered nature of the fishing centres, special mention of a few important places, having a good trade in this commodity appears desirable. At many of these places as given in Appendix VIII supplies could be increased by exploiting the resources more intensively or by importing from adjacent areas.

The marketing survey has disclosed that markets are generally under-supplied almost everywhere. The four months of the monsoon are usually a period of fish famine, particularly in areas which draw their supplies from the sea. During these months, none of the large coastal towns gets the quantities of fish which it requires. There are thus good prospects of developing the fishing industry on scientific lines by setting up cold storage installations (for fresh fish) and better processing yards (for cured fish and fish-products).

C—Imports of fish and fishery products into India

Quantity.—Imports of fish and fish-products into India during the period 1950-51 to 1958 are given in Appendix IX (a).

The main varieties of fish imported consist of fish dried unsalted, fish dried salted and fish wet salted. The imports of such preserved fish have varied from year to year and had a declining tendency on the whole. The imports of canned fish has remained more or less steady from 1952-53 to 1957 though the quantity imported in 1951-52 was rather high. Fish maws and sharkfins have been showing a downward trend of imports from 1952-53. The import of whale oil on the other hand, has been gradually increasing from 1952-53 onwards. Taking the total quantity of fish and fishery products imported during the period under review it is observed that the imports showed an increase from 1952-53 to 1955-56 and thereafter there has been a gradual fall.

Published data on imports of fish from East Pakistan in fresh and chilled condition is available only from the year 1957. The quantity shown to be imported from East Pakistan during the previous years,

however, is based on the enquiries made during the course of this survey and relate to the calendar year commencing from 1950. It will be observed from the appendix that the imports of fish from East Pakistan which contributes a major share in the total imports fluctuated slightly during the years 1950 to 1952 but in later years there was considerable increase till they reached the peak in 1955. During the subsequent years, these imports showed a downward trend and in 1958 the quantity fell to less than half the quantity imported in 1955.

Value.—Value of fish imports is indicated in Appendix IX (b). It will be observed that fish (fresh, chilled and frozen) imported from East Pakistan constitutes a major portion of the import value. The import value of fish from Pakistan gradually rose from 1951-52 to 1955-56 but in 1957 it showed a slight fall and maintained the same position in 1958. Next to the above four varieties, canned fish imported has also been draining a considerable sum. The import has been enormous in 1951-52 followed by much less import from 1952-53 to 1954-55, again a recovery during 1955-56 and 1957, but declining to the 1950-51 level in 1958. Cod liver oil and other fish oil are also imported considerably at considerable value to the detriment of India's foreign exchange resources. The total import value during the years under review is low in 1950-51 showing an increase in 1951-52, maintaining it till 1953-54 and again a rise in 1954-55, maintaining it in the subsequent years. In 1957 and 1958, however, there was a slight fall.

Among the imported products, canned fish, cod liver oil and whale oil have cost the country more than any other product imported in respect of price per cwt. The general trend of prices per cwt. for the years 1951-52 to 1955-56 shows more or less slight fluctuations. The prices in 1957 shot up in case of dried unsalted fish, dried salted fish and fish maws and sharkfins with further rise in 1958. The prices in 1957 were, however, slightly lower for cod liver oil and whale oil.

Periodicity.—The monthly variations in the quantities of fish imported into India may be seen in Appendix X. There is a similarity between the monthly periodicity of imports of preserved fish and the seasonal variations in the production of fish along the Arabian Sea Coast of India. This is due to the fact that preserved fish is brought from Arabia in sailing vessels during the fair weather season when the Arabian sea is navigable by sailing craft and which also is the fishing season along the Indian coast. As regards canned fish and fish of other sorts the imports are uniformly distributed throughout the year for the reason that large steamers which bring fish from Europe and America and land their cargo in harbour which are open all through the year are not exposed to the vagaries of the weather conditions unlike the sailing ships from Arabia.

Imports of fish (fresh, chilled and frozen) from East Pakistan into Calcutta and Howrah markets show somewhat different periodicity, the months of high imports being June to March. Imports of cod liver oil are fairly evenly distributed during the different months of the year.

Source of imports.—The countries consigning preserved fish for import into India during the years 1949-50 to 1953-54 are shown in the following table.

TABLE NO. 10

Countries consigning preserved fish for import into India

(Percentage to total by weight)

Name of the countries from whence imported	1949-50	1950-51	1951-52	1952-53	1953-54	Quinquennial Average
Commonwealth Countries :						
United Kingdom	1.2	0.8	1.9	1.8	1.7	1.4
Pakistan	39.6	32.4	28.9	29.6	27.6	31.4
Other Commonwealth Countries.	1.8	5.7	0.1	1.5	15.4	4.6
TOTAL	42.6	38.9	30.9	32.9	44.7	37.4
Foreign Countries :						
Muscat & Oman	46.9	49.3	52.4	49.0	53.9	50.3
Iraq		9.0	15.2	17.5	1.4	9.3
Other foreign countries.	10.5	2.8	1.5	0.6		3.0
TOTAL	57.4	61.1	69.1	67.1	55.3	62.6
Total Quantity imported into India (in cwts.).	62,187	84,988	87,871	73,275	63,733	74,411
Total Quantity imported into India (Metric tons).	3,159	4,318	4,464	3,723	3,238	3,780
Total value of Imports (Rupees).	20,11,926	22,70,530	21,69,305	18,82,692	16,11,482	19,89,187

It will be observed from the above table that the bulk of imports are from Muscat and Oman accounting for a little more than half of the total imports of preserved fish. Pakistan comes next with 31.4 per cent of the total imports. During the years 1957 and 1958, however, Pakistan was the main source accounting for more than half of the imports of preserved fish in 1957 and more than 3/4th in 1958 in addition to the whole supply of fresh fish in chilled and frozen condition.

In the case of canned fish, United Kingdom accounted for the largest imports which have gone upto 31·3 per cent for the quinquennium ending 1952-53 to 58·9 per cent during the year 1953-54 as will be seen from the following table.

TABLE NO. 11
Countries despatching canned fish to India

(Percentage to total by weight)

Name of the countries from whence imported	Average for quinquennium ending 1952-53	1953-54
1	2	3
Commonwealth Countries:		
United Kingdom	31·3	58·9
Canada	17·2	6·5
Australia	5·3	..
Other Commonwealth countries	2·6	1·7
Foreign Countries :		
Norway	25·8	16·9
Netherlands	3·1	3·6
Japan	2·5	3·4
U.S.A.	4·5	5·6
Other foreign countries	7·7	3·4
Total quantity imported (Cwts.)	4,585·2	3,516·0
Total quantity imported (Metric tons)	232·9	178·6
Total Value of Imports (Rupees)	7,72,708	4,68,009

During 1957 and 1958 also the U.K. continued to be the main source of supply the percentage to total being 49·1 in 1957 and 31·2 in 1958.

The main source for the import of cod liver oil was United Kingdom accounting for 84 per cent of the average total imports during the quinquennium ending 1953-54. Norway was the second important source accounting for 14·1 per cent of the total. In 1957 and 1958 the share of U.K. was 89·9 and 91·4 per cent of the total imports respectively.

For whale oil also, U.K. has been the main source accounting for nearly 80 per cent of the total imports during the years 1957 and 1958.

Import duty.—Import duties are levied as per Indian Customs Tariff Act. Duties for different commodities in 1959 varied as given below:—

(a) Fish salted, wet	Re. 1/- per Indian md., plus 10 per cent <i>ad valorem</i> .
(b) Fish unsalted, dry	40 per cent <i>ad valorem</i> (from British colony, 30 per cent and from Burma 10 per cent).
(c) Fish maws	30% <i>ad valorem</i> (10 per cent for import from Burma).
(d) Canned fish other than sardines and pilchards.	20 per cent <i>ad valorem</i> .
(e) Canned sardines and pilchards	20 per cent <i>ad valorem</i> .
(f) Isinglass	35 per cent <i>ad valorem</i> .
(g) fish oil and whale oil hardened or hy- drogenated.	Rs. 10 per cwt.
(h) fish oil and whale oil not otherwise specified.	35 per cent <i>ad valorem</i> .
(i) all animal oils not otherwise specified	35 per cent <i>ad valorem</i> .

Under the existing regulations, no duty is levied on import from Pakistan.

D—Exports of fish and fishery products from India

Quantity.—Exports of fish and fishery products from India together with their value and export price for the period 1950-51 to 1958 are given in Appendices XI (a) to XI (c). Although exports fall under 12 items of fisheries products, those of major importance are dried unsalted fish, dried salted fish and Prawns (fresh, chilled, frozen, salted, dried or simply cooked.) The exports of dried unsalted and salted fish have varied from year to year the highest exports for the former were in 1953-54 and for the later in 1958. Export figures for prawns are

available only for the years 1957 and 1958. Dried unsalted and dried salted fish are prepared all along the coastal regions on a cottage industry basis.

Indian canned fish entered the export trade in 1957 but the quantum exported is very small. The export of fish manure and fish-guano which was low till 1952-53 recovered considerably thereafter. Fish manure is considered as a valuable organic manure and the present policy is to gradually reduce its export so as to utilise the same within the country for increasing the agricultural production. Exports of fish manure are limited to quotas announced by the Government from time to time. Till July 1958 fish meal and fish manure were allowed within joint quotas but later separate quotas have been fixed. The quotas for export of fish meal are determined in consultation with the Ministry of Food & Agriculture and released every half year. It is licensed freely against the quota at the ports of Bombay and Cochin from where exports take place. The following table gives information regarding release of quotas and quantities licensed against such quotas since 1956.

TABLE NO. 12

Quantity of fish meal and fish manure released on quota basis

Period	Name of Item	Quantity in tons	
		Quota	Quantity licensed
January to June, 1956	Fish meal & fish manure	2,125	1,975
July to December, 1956	Ditto.	2,525	798
January to June, 1957	Ditto.	2,325	2,021
July to December, 1957	Ditto.	2,325	1,424
January to September, 1958	Ditto.	2,400	1,263
October 1958 to March 1959	Fish meal	3,500	2,500 (upto February, 1959).
April to September, 1959	Ditto.	2,000	N.A.

The export of fish-maws and shark-fins is more or less steady throughout the period under review.

Value.—Value of fish export generally follows the trend indicated with regard to the quantity except that for the dried unsalted, salted and wet salted varieties, the value realised has been more in 1954-55 whereas the quantity exported was larger in 1953-54. In 1957, however, the dried unsalted fish has realised much less than in the previous years due to the fact that lesser quantity of the variety was exported. The reduction under this category was more than offset by the high value of prawns (fresh, chilled, frozen, salted, dried or simply cooked). Fish manure and fish-guano which had a sudden spurt in 1953-54 reaching the peak in 1954-55 and maintaining the same tempo in 1955-56, shows considerable fall in the subsequent years. Fish-maws and shark-fins realised a high value in 1952-53 and in the subsequent years it has been falling. In 1957 and 1958 there has been a recovery. The total export value realised from 1950-51 shows an upward trend till 1954-55 and in the subsequent years there is a slight fall but in 1957 it has almost touched the 1954-55 level with a further increase in 1958 when the exports reached the peak. Amongst the items of exports, canned fish, fish-maws and shark-fins, other crustacea and molluscs and prawns had the highest export price per cwt.

Periodicity.—The exports take place all the year round, being high from September to March as will be seen from Appendix XII.

Destinations.—The destinations of Indian exports and the share of the ports handling the preserved fish trade during the years 1949-50 to 1953-54 are given in the following table.

TABLE NO. 13

Share of countries importing preserved fish from India
(Percentage to total)

Particulars	1949-50	50-51	51-52	52-53	53-54	Average
1	2	3	4	5	6	7
Total quantity exported (cwts.).	321,316	386,811	435,269	487,815	556,242	437,491
Importing countries:						
Ceylon . . .	79.7	84.8	79.1	71.8	61.3	74.0
Singapore . .	1.1	1.0	1.2	5.1	9.0	4.0
Hongkong . .	0.7	0.2	0.1	0.3	0.7	0.4
Mauritius & Dependencies.	0.6	0.7	0.7	1.0	1.0	0.8
Other Commonwealth countries	1.0	0.6	1.9	1.3	1.8	1.4

TABLE NO. 13—*contd.*

1	2	3	4	5	6	7
Burma	15·7	12·6	16·9	20·4	22·5	18·2
Other foreign countries.	1·2	0·1	0·1	0·1	3·7	1·2
Share of West Bengal Port.	0·3	0·1	1·7	0·9	0·3	0·7
Share of Madras	95·5	94·8	84·2	75·0	65·0	80·8
Share of Travancore-Cochin	Neg.	..	..	Neg.	27·9	7·1
Share of Cochin	..	..	7·8	18·5	..	5·7
Share of Bombay	4·2	5·1	6·3	5·6	6·8	5·7
Total	100·0	100·0	100·0	100·0	100·0	100·0

It will be observed from the table that the neighbouring country Ceylon is the principal buyer, the average of her share in imports during the quinquennium ending 1953-54 being 74·0 per cent. Her share in 1957 and 1958 was 64·0 and 79·9 per cent respectively. Burma comes next with 18·2 per cent during the quinquennium ending 1953-54, 28·5 per cent in 1957 and 14·9 per cent in 1958. Among the exporting ports, Madras ports accounted for the bulk of exports with 80·8 per cent as their share.

Burma has been the chief importer of sun dried prawns the main port for export being Cochin. Of late there has also been a great demand for canned prawns from U.S.A., Canada and Sweden. Fish-maws and sharkfins are mostly exported to Singapore accounting for more than half of the total exports during the years 1957 and 1958. Western Germany, which was the main buyer importing 64·2 per cent of the total fish manure export from India during 1953-54 was second in 1957 when she took 41·7 per cent of the total exports of fish-meal, fish fertilizers and fish-guano in the form of fish meal only. In 1958 her share was only 6·8 per cent comprising of 2·3 per cent fish-meal and 4·5 per cent fish-guano. United Kingdom was the principal buyer of fish-guano in 1957 and of fish-meal in 1958 accounting for 88 per cent and 51·5 per cent of the exports of respective varieties from India.

In the more advanced countries quality standards are prescribed and enforced under law both to raise the prestige of the products in the foreign countries as well as to obtain the maximum prices for the products. In India no such standards were in existence for fishery products and the quality of the exported products is only indirectly governed by the standards prescribed by the importing countries as a result

of which Indian products are unable to enter into more remunerative and competitive markets. Recently a beginning has been made for the introduction of specifications with regard to fish-meal and fish-manure in the export policy (See page 76).

E—Re-exports of fish products from India.

The re-exports of fish products from India are insignificant when compared with the quantities of Indian produce that are exported. There were no re-exports during the period 1951-52 to 1956. In 1957, however, 82 cwts. of fish dried unsalted and 6 cwts. of prawns were re-exported to Kenya and Burma respectively. The re-exports during 1958 were 4 cwts. of fresh fish (simply preserved) to Switzerland valued at Rs. 1800.

F—Total value of imports into and exports from India.

In the absence of precise information regarding the various fish products traded in, it has not been possible to reduce the quantities of imports and exports into equivalent weights as fresh fish and work out the net available supplies. The following table, however, gives the total value of different products imported into and exported from India during the years 1950-51 to 1958.

TABLE NO. 14

Total value of different fish products imported into and exported from India
(In thousand rupees)

Years	Exports	Imports	Favourable balance
1950-51	24,559	2,882	21,677
1951-52	32,863	18,324	14,539
1952-53	38,700	16,016	22,684
1953-54	44,033	18,715	25,318
1954-55	46,675	28,385	18,290
1955-56	39,219	32,587	6,632
1956 (April to December) . . .	37,201	17,750	19,451
1957	45,861	23,060	22,801
1958	58,647	20,834	37,813

It will be observed from the above that throughout the years under review India's foreign trade in fishery products has shown favourable balance.

CHAPTER IV—PREPARATION FOR THE MARKET

A—General

Among the perishable foods fish is most liable to taint and tainted fish, if taken, causes food poisoning. When the fish is alive in its medium *viz.* water, the bacteria carried on its body surface, on the gills and in the guts do not invade the flesh and cause its spoilage, but when the fish is taken out of water and is dead these bacteria begin to attack the flesh. The need for preservation of fish immediately after it is caught and before the bacteria start their action is, therefore, paramount.

Time is an important factor in the control of the multiplication and activities of these bacteria, which in turn affect the preservation of fish. In the warm climate of the country, due to the combined action of 'bacteria' and 'enzymes' the quality of fish deteriorates very rapidly and ordinarily fish are unfit for human consumption eight hours after being caught, unless otherwise treated in the interval. Expeditious attention to preservation and cleanliness are two essential precautions to be remembered. To quote Sir Frederic Nicholson "cleanliness first and always and everywhere. There is nothing so essential, nothing so neglected in this tropical climate as cleanliness". Fish as soon as caught should be washed to remove the major part of surface bacteria, blood stains, faeces etc. The presence of which accelerates fish spoilage. The large fish must be gutted to remove the viscera and the body cavity washed. The fish must be stored in clean places and facilities for icing of the fish must be provided when the fish has to be transported to long distances.

Most of the marketable surplus of fish caught from inland waters such as rivers and tanks is consumed as fresh fish. The preparation of such fish for inland markets in most parts of the country consists in merely washing and packing in ice wherever available.

Regarding sea fisheries, the position is different. The industry is scattered over a long coast line, fish supplies are irregular, the producers work on individualistic lines or in small groups and the quantity caught by each fisherman or a party of them is always small. The method of catching, the smallness of the boats, and certain established customs hinder the adoption of steps which could keep fish free from taint during transit from the time of catching to the shore. The boats have often to stay for hours to get a sufficient catch during which time the fish heaped in them get trodden upon and are exposed to the full glare of the sun. Except the markets that are about 5 miles distant from the coast and a few interior areas to which fish is dispatched with ice, the supply of fresh marine fish in India is not always fresh. The bulk of the sea fish are sun-dried or cured with salt and in this form reach consumers inland. On the other hand, one sometimes finds large shoals, unexpectedly contracted and enormous catches being made. Moreover, there are again a number of fish caught from the sea which are little utilized as food, either because of unfounded prejudice against them or of the

ignorance of the general public regarding their quality. As a result many varieties have to be converted into industrial products like manure "guano" etc.

B—Methods employed regarding

(1) CATCHING

Fishermen and others engaged in catching fish employ various types of boats and nets in the different States, the gear being adapted to the different conditions of weather, physical characteristics of the coast or water to be fished etc. These have been discussed fully in Chapter II "Fishing gear and methods of fishing" of this report.

(2) COLLECTING

The fish caught are put in a heap in the boat or in a coir net. Generally boats land fish either early in the morning or after 4 O'clock in the evening, but if shoals are contacted, the boats get quickly filled and catches may come at any moment. At fishing sites which are served by rail, fishermen generally collect their catch to suit the local Railway timings. The catches are handed over to the fisher-folk or to the middlemen who first sort the fish according to varieties and size and arrange for sale.

If fish could be rapidly collected from fishing sites and immediately transported to the urban coastal markets, a greater percentage of the catch could be utilised as fresh fish. The use of motor "fish carriers" by the Bombay merchants has enabled the transport of fresh fish from places 200-300 miles from Bombay. In 1933 the Government showed the way by using one power propelled boat to bring fish from adjacent fishing centres to the city. The field of operations quickly extended and within two years fishing centres, 200-300 miles away from Bombay were being regularly visited. In 1938 the four carriers which the Government had constructed were purchased by private persons. By 1956, the number of carriers had increased to about 600 boats.

Most of the important fishing centres in West Bengal are far away from the nearest rail or steam heads (sometimes 60 to 80 miles). The plying of more than 50 motor launches in recent years has quickened the transport of fish considerably from 'sunderban' where a number of fishing centres are located. Still it takes more than two days for the fish to reach the markets and the launches which work for about 16 hours a day during peak fishing season are used as passenger boats during the off-season.

In Madras 9 motor vehicles were hired out to fishermen co-operatives for transport of fish from landing centres to consuming centres during the year 1956-57. These vehicles transported 752 tons of fish. Three vehicles were also given under the hire purchase system to the Federations at Tuticorin and Tanjore and to the Porto Novo Society.

Fish carriers, however, are not new to this country. Middlemen in consuming markets have been and still are using sailing boats for collecting fish from boats in the sea. The limitations of a sailing boat

for this work are obvious. The motor-boat has the advantage of speed, freedom from the vagaries of weather and a greater cruising capacity. Properly equipped with an ice room for stowing the fish and operated from a base where there is a local demand for fresh fish and where cheap ice as well as facilities for sending chilled fish by rail to distant markets are available, motor carriers should prove very useful. The use of carriers on the west coast in Kerala State with bases at Kozhikode and Cochin would result in the opening up of large markets for fresh sardines mackerels and other varieties in the inland.

Fresh water fish are generally collected by the fishermen and despatched by the quickest means of transport. In West Bengal, "Live" fishes, which fetch a high price if sold alive and which are caught in bits and other confined waters, are collected and transported in the holds of boats, in water, over long distances. Carps are also transported alive in a similar manner. Certain estuarine varieties are towed to rail or steamer stations, in "Hapers" which are cylindrical split bamboo cages with a trap door on the top. The quantities collected and transported in the live condition are, however, small.

(3) GUTTING AND CLEANING

The process of removing the viscera is termed gutting (*see* lower plate facing page 33). This is generally accomplished by making a long cut along the dorsal or ventral line of the fish by means of a knife and pulling out the various internal organs by hand. Freshwater fish are usually gutted by fishermen as soon as the catch is landed. Gutting of sea-fish is not done so promptly although this is an essential preliminary to every kind of salting and drying process. Only large varieties earmarked for transport to distant centres receive immediate attention. In a tropical country like India the necessity for quickly removing the viscera is important. Ordinary varieties are not gutted till they are on the point of entering the fish curing or drying yards *i.e.* about 5 to 6 hours after death. The gutted fish are seldom washed. The entrails are thrown about in haphazard way and no attempts are made to utilize them as manure or even to dispose them of properly. Greater and more widespread use of fish carriers, refrigerated railway wagons and other quick transport facilities would result in considerable improvement in the methods of handling the fish. The fishermen should be induced to gut all varieties immediately after the catches have been landed and the public educated to take gutted-fish. This is one of the important items of work for the Fishery extension units both in the States and at the centre. When the gutting and cleaning of fish on the beach is organised, it would be easy to salvage and collect the inedible matter, which forms 15-20 per cent of the raw weight for use as nitrogenous manure.

C—Preservation and curing of fish

All the processes which inhibit or wholly arrest postmortem changes in animal products *e.g.* refrigeration desiccation, pickling, smoking, the use of anti-septics, canning etc. can be utilized for the preservation of fish.

(1) REFRIGERATION

The multiplication of bacteria and their activities increase rapidly with the increase in temperature. The weather conditions in the tropics, where the average temperature ranges between 25 and 32°C are ideal for the bacterial causing spoilage. Lowering of the temperature suppresses the growth and activities of bacteria and thus extends the storage life of fish by a number of days. The method of treatment differs according to the period of preservation required. When fish has to be kept for one or two days it is only chilled, while for long storage it is frozen. In India fish is chilled usually with crushed ice and fish thus preserved is popularly known as iced-fish. Iced-fish is transported over long distances with or without saw dust.

Ice is usually available in all parts of the country and more ice plants to produce block ice have been brought into existence in the past few years. Even so ice is yet a scarce commodity in many fishing areas where ice plants as such do not exist and heavy transport charges from the nearest ice factory make the ice beyond the means of the fishermen.

When storage facilities are available near the sea coast the fish merchants keep baskets of fish, often packed with crushed ice in the chilled room of the cold storage. In Bombay city the Municipal Corporation has been operating a suitable chilled room within the Crawford market since 1923.

The Government of India has set up in 1951 an ice-cum-cold storage plant in Bombay with a capacity of 20 tons of ice and 20 tons of fish storage at 28°F. 15 tons freezing capacity and 250 tons frozen fish storage capacity at 0°F. Encouraged by the success of the above storage plant 11 more ice-cum-cold storage plants procured under T.C.M. Fishery programme have been obtained and located at important centres in various States as follows :

Bombay	4
Madras	2
Orissa	2
Kerala	2
Andhra	1

Bombay.—Apart from the Government of India plant at Bombay one T.C.M. plant each at Satpati and Versova with a capacity for 10 tons ice and 150 tons cold storage and quick freezing facilities have also been made available and installation is almost complete. In the Bombay City itself there are 4 more privately owned cold storages with the total storage capacity of 800 to 900 tons.

In the Saurashtra and Cutch region of the Bombay State 2 T.C.M. ice and cold storage plants are being installed at Porbundar and Kandla. In addition, three more are being installed by the Department at Veraval, Mangrol and Jamnagar. Those at Veraval and Kandla have 12 tons ice and 15 to 60 tons cold storage capacity whereas those at Porbundar

and Mangrol have 5 ton ice and 30 ton cold storage capacity. The plant at Jamnagar has 5 ton ice and 30 ton cold storage capacity. All these ice-cum-storage plants would start functioning shortly.

Mysore.—One ice-cum-cold storage-cum-freezing plant has been installed at Mangalore with a capacity of 5 ton ice and 30 ton cold storage.

Kerala.—Ice and cold storage plants exist at Trivandrum, Kozhikode, Cochin and Quilon. The Cochin plant has the capacity for 24 ton ice, 400 ton cold storage and 5 ton quick freezing and the one at Quilon constructed by the Indo-Norwegian Project has a capacity of 25 ton ice, 100 ton fish storage and 125 ton frozen fish storage and 6·7 ton freezing capacity. 2 more plants with 5 ton ice and 30 ton cold storage capacity procured under TCM are being installed at Vizingam and Kayamkulam with the commissioning of the Government cold storages.

Madras.—2 ice and cold storage factories each with 5 ton ice and 15 ton cold storage capacity are being installed at Mettur Dam and Tuticorin and the work would be completed shortly.

Orissa.—One ice-cum-cold storage plant has already been set up at Kujang and another is being installed at Balagan on the Chilka Lake.

The combined cold storage capacity of all the above plants is far below the minimum requirements and hence it is essential that greater efforts are made to procure more ice and cold storage plants to be installed. The order of preference for establishment of cold storages should be consuming centres, assembling centres and landing centres.

Cold storage facilities for keeping chilled fish are now on the increase.

Latest methods of quick freezing have been introduced in some units e.g. Satpati & Kolaba in Bombay State. These methods will bring about such low temperatures as to freeze fish quickly in order that the cells may not crystalize as they would in the slow method of freezing.

In recent years after commissioning of the government cold storage plants at Kozhikode and Mangalore many private companies have taken up a business of exporting shrimps (prawns) lobstertails and froglegs to the United States.

(2) CANNING

Owing to the restrictions on import of canned fish, the demand for local canned fish has been steadily increasing, and there appear to be potentialities for the development of canned fish industry. The demand for canned fish in India would increase further if its price is brought down so as to be within the reach of the average middle class. The high cost of tin containers is the chief factor for contributing towards the present high prices of canned fish.

The first fish cannery was established at Chaliyam (South Malabar) in Kerala State in the year 1911 by the then Madras Government. Subsequently this canning factory was taken over by a private fishing company in Malabar. The daily production capacity of the plant is 10,000 cans. However, during the year 1955-56 only a lakh of tins were canned. Apart from Chaliyam there are other factories in and around Cochin and in Malpe in Mysore. Some of these factories are trying to club fruit canning like pine-apple etc. along with prawn and fish canning. The Malabar Fisheries Co. has been fabricating containers for other products also.

In Bombay State canning of "pomfret" has been undertaken and is gaining popularity in local markets. In U.P. attempts are being made by private firms to can "Rohu-curry" and "Kababs" using mustard oil as the medium to suit the taste of the local people.

As regards supplies of fish suitable for canning although fishing is carried on all along the extensive sea coast, adequate quantities of fish of a uniform size and quality so as to permit economic canning are difficult to obtain, even during specified and limited season. The large fish canneries in the world depend for the raw material either on pelagic species like the Herrings, Brislings, etc. or on Andromous type like the Salmon. These are shoaling fish and appear in certain well defined localities very regularly year after year. In India, Sardine (*Sardinella Longiceps*) and Mackerel (*Rastrelliger Kanagurta*) appear in pelagic shoals but their movements are very uncertain. These species are also bony.

The difficulties in the development of canning in India are absence of regular supplies of fish, lack of good and cheap containers, the short canning season which is only about 100 out of 365 days (The problem is how to keep the skilled staff engaged during the remainder of the year) and "mistrust" in the market.

With a view to ensure adequate supply of tin containers to the exporters, a Scheme for supply of tin plates against export of tinned fish has been drawn up by the Government of India, Ministry of Commerce and Industry and is applicable to all exports of tinned fish made on or after the 1st of April, 1959. Under this Scheme, persons who are engaged in canning fish and are desirous of taking advantage of the Scheme have to get themselves registered with the Deputy Chief Controller of Imports and Exports, Ernakulam. On registration the exporters desirous of tin plate quotas have to put in an application giving the exports of tinned fish made in the past or proposed to be done in future. The Deputy Chief Controller forwards such applications with his recommendations to the Deputy Chief Controller (Export Promotion), Madras for issue of quota certificates or for further recommending them to the Iron and Steel Controller, after assuring himself of all the formalities required to be attended to by the exporters concerned. The tin plates recommended for allotment, under the scheme, are of indigenous material only.

The Fisheries Development Adviser to the Government of India, Ministry of Food and Agriculture occasionally exercises a check in the market to see that the containers manufactured with tin plates received under this quota are not misused.

For stimulating, instructing and aiding private enterprise the local Governments should maintain experts who should also investigate the technical problem connected with the canning industry. Receipts which would appeal to Indian taste should be worked out and the possibilities of canning prawns, oysters and crabs and fresh water fish such as Rohu and Catla should also be investigated. Goods which conform to well-known standards should be certified. In foreign countries canned marine products are graded and Indian goods should also be graded according to certain defined standards. The Development Council for Food Processing Industries in the Ministry of Commerce & Industry have also laid great stress for the formulation of specifications for fish products and cans for this industry.

(3) CURING

The Chief methods of curing fish in India are sun-drying without salt, salt curing by the dray process and salt curing by the wet process and warmth. The object of curing is, therefore, to withdraw the natural moisture from the tissue cells of the fish to prevent bacterial action as well as enzymic decomposition which act rapidly in the presence of moisture. Water constitutes about 75 to 80 per cent of the weight of raw fish. To obtain a wholesome cure the drying process should be rapid and thorough. This can be achieved by (a) heat (b) dry air (c) salt and (d) salt and pressure. In the first two processes moisture alone is removed from cells by hot or dry air, in the third process salt by the process of osmosis displaces the fluid contents of the cells including not merely water but also the nutritive constituents present in the crystalloidal condition within the cells. Application of pressure drives out the water contents from the cells together with what has already been extracted from the cells by salt.

In India drying is preferred to salting by the fishermen. As salt is expensive, wet salting is rarely practised. When salt is used, it is applied only sparingly and putrefaction is prevented by the subsequent heavy drying. The quality of salt has much to do with the quality of the resultant product. In short, only pure salt with a high sodium chloride content (96 to 98 per cent) should be used. Salts of calcium and magnesium must when present in small quantities give the fish toughness but excess of these cause spoilage. It has been found that salts having higher magnesium and calcium content coupled with higher counts of red-salt bacteria, are responsible for the 'Pink eye' of salt fish which consequently brings spoilage. There is also a tendency among fishermen to cure unsold and tainted fish. Such products do not keep long and often crumble. In general the principles underlying these methods are fundamentally sound but when not applied with care result in unsatisfactory products which are unattractive and less appetising though not unwholesome.



SMOKE HOUSE.

In actual practice the type of cure depends upon the kind of fish to be cured, climate, materials available for curing, the length of time for which the fish are to be kept and above all on the requirements of the intended market.

The table below indicates approximately the quantity of fresh fish cured by various methods in India. These figures are only approximate as separate statistics are not maintained for dry and wet salted in the Government fish curing yards and further with regard to curing outside the yards only rough estimates are possible.

TABLE NO. 15

Statement showing the estimated amount of fish cured in certain areas in India

(In thousand maunds)

State	Government fish-curing yards			Outside fish-curing yards			Grand Total
	Wet salted	Dry salted	Total	Sun dried	Salted	Total	
Madras (including Malabar & S. Kanara)	120	1302	1422	2224	678	2902	4324
Kerala	Neg.	324	324	1200	1728	2928	3252
Bombay	117	118	235	2313	224	2537	2772
Orissa	..	..	..	..	..	..	..
West Bengal	..	Neg.	..	..	..	..	Neg.
TOTAL	237	1744	1981	5737	2630	8367	10348

(a) *Sun-drying*.—Drying in the sun or in the shade is the simplest method of curing fish and theoretically also the best, because the nutrients are not withdrawn from the cells and wasted as in salting. But a good cure is impossible on the tropical sea-coasts because the air, though hot, is very moist and the exterior of a thick tissue is toasted into a hardened surface when exposed to the sun, the inside remaining still moist and warm. In dry regions like the interior of West Bengal and Assam, sun-drying is relatively more successful especially when the operations are carried on in winter.

Small or thin fishes such as Bombay duck, ribbon fish, prawns, silver-bellies, white bait, etc., are dried in the sun all along the coasts, chiefly where curing yards are not easily accessible or when the fish

caught are very much in excess. The catch is simply spread on the beach in a thin layer on a coir mat or bamboo *thatties* to prevent admixture with sand, and dried for a day or two. Periodically the fish are turned over and before night fall removed and heaped up in a closed enclosure. Sun-dried fish always contain 5 to 6 per cent sand as impurity. In the absence of sun shine, the fish especially the oily varieties putrefy and may have to be disposed of as manure. A few special products like shark fins, fish maws and trepang (*beche-de-mer*) as well as prawns with or without shells, shrimps and white bait are always dried without salt. On the Gujarat coast and in Kathiawar all varieties except Jew fishes are sun-dried. In West Bengal in the Midnapur and 24 Parganas the sea and estuarine fish are cured by simple sun-drying on the foreshore of the Bay of Bengal. In Assam, 'Sutki' the common sun-dried fish is prepared mainly from freshwater carps such as labeos, catla, etc. After gutting, the fish are laid flat side by side on mats made of reeds and exposed to the sun. Sometime, there are bamboo platforms 3-4 feet high to spread the fish on. The drying process is continuous and extends for 7 to 10 days depending on the sunshine and the fish are not removed at night. In other States, the fishermen are reported to dry small quantities of fish which they are unable to sell or consume themselves. The quantities so produced are, however, quite negligible.

The above method of curing is extensively used and it is estimated that as much as 20 per cent of the total catch of sea and 2.6 per cent of the annual freshwater catch is cured in this manner.

(b) *Curing with salt*—There are two methods in vogue commonly known as (i) the Common Cure or Dry Cure, and (ii) the Ratnagiri or the Wet Cure. In addition, small varieties which are intended for quick consumption are sometimes "light-cured" in certain coastal areas. This process consists in salting the gutted and cleaned fish lightly by keeping them for a few hours in the saturated brine solution and completing the cure by washing and drying in the sun.

(i) *Common cure or the dry cure*.—Large fish as seer, pomfrets, cat-fish, Jew-fish, perches, etc. are split through in the dorsal line from the root of the tail to the tip of the snout and the guts and gills are removed. In this position, the vertebral column remains attached to one side of the fish. The vertebral column is next served from the fishy side for the greater part of the depth of the fish but is not cut and removed. This operation gives the fish a wide flat shape. Scores are then made on the thick fleshy parts by passing the knife lengthwise. After washing, the fish are ready for the application of salt. In the case of thinner fish such as ribbon fish, mackerels, small pomfrets, etc., only the first dorsal cut is made. Mackerels are sometimes slit in the abdomen. Sardines are cured either by cutting off the head and the abdomen with a single diagonal cut or by simply slitting and removing the guts and gills. Large sharks are cut into pieces of convenient size and filleted.* All cut-up fish are usually washed in sea water before salting.

*See glossary.

The proportion of salt used varies in the different States. In Bombay, it is one part of salt to every five parts of fish irrespective of the variety or the season. In the Madras yards, fish are divided into five groups for purposes of issuing salt. The proportion of salt is fixed with regard to the thickness of flesh of the fish and weather conditions. Large fish get 1·3 in wet weather and 1·4 in dry weather, while smaller varieties are given only 1·8 or 1·10. The higher proportion allowed during the wet weather is to enable more thorough expression of moisture through application of more salt to compensate for unsatisfactory drying. In Cochin, the proportion is invariably 1·8. In Travancore the officers in charge of fish curing yards are given discretion to classify fish into "fat" and "lean" varieties, the proportion being 1·3 for the former and 1·4 for the later.

The salt used is marine salt obtained by the slow evaporation of brine from the sea or subsoil in open pans. It consists of coarse small crystals with the colour ranging from brownish white to white and containing about 4·5 per cent saline impurities (calcium and magnesium sulphates and chlorides), 0·5 to 1·0 per cent insolubles and 12 per cent moisture.

The salt is applied to the scores and rubbed all over the cut surface. The fish are then arranged in layers in salting receptacles such as half-barrels, tubs, small dug-out canoes or cemented tanks. Old canoes are very popular for this purpose in the Bombay State. On the east coast of the Andhra Pradesh, salting is done in earthen pots in Northern Circars, and in pits, *chatties* (mud pots) or hollowed palmyra butts in the Tamil districts of Madras State. Generally, the fish are kept in salt for 12 to 18 hours. They are then taken out, washed in the "self-brine"* found in the salting vessels and put out in the sun on coir mats or cadjan leaves spread on the sand. A second washing in sea water after salting improves the appearance and colour of the fish, but as the washed fish would weigh less after cure, this is rarely done. It takes at least two days to dry the fish.

Small fish dry better than larger varieties. The fish also absorb salt during the curing process, hence it is difficult to calculate the real dryage, i.e. the net loss in weight. In the Madras yards, the average percentage is 40. Roughly it can be stated that large fish lose about one-third and small fish one-half of their dressed weight by dryage. Cured fish from fish curing yards are further dried for a day or two before despatch. For long storage, the fish are periodically exposed to the sun by curers or merchants.

(ii) *Wet salting or the "Ratnagiri" method of curing.*—As the name indicates, this is the cure generally adopted in the Konkan districts of Bombay State. Large fish such as seer, black pomfrets, sharks, Indian salmon, etc. are generally treated in this manner. The fish are split, gutted and cleaned as for dry-salting. One pound of salt is required

*See glossary

for every three pounds of fish; half the quantity of salt is rubbed on the cut surface of the fish on the first day which are then stacked on the floor of the curing shed to a height of 3 to 4 feet. On the second day, half the remaining salt is rubbed in and the fish so re-stacked that the top fish become the bottom ones; on the third day the remaining salt is applied and the fish re-stacked again. They are allowed to remain in this condition for another eight days and then removed; they are not sun-dried afterwards. The foul brine flowing from the stacks is absorbed by the sand on the floor of the shed. Curers from Goa, Ratnagiri, Viziadrug and other places in the Bombay State resort to certain Mysore yards, situated in South Kanara to cure fish by this method. Fishermen who go out in the so-called "Ratnagiri boats" and stay out for periods upto a week in the sea always cure their catch in this manner.

The finished product is very moist and yields to the light pressure of a finger. Fish cured in this manner has to be consumed before the rains set in and in any case it can not be kept for more than 3 to 4 months. Wet-salted fish normally contain 60 per cent of water, 16 per cent salt and 24 per cent solid matter, against 80 per cent water and 20 per cent solid matter in raw fish.

(c) *Smoking*.—Smoking is almost as universal as salt curing in every country except India. The exception is probably due to the comparatively less need for a fire (for warming) in the coastal areas in this country. The preserving power of smoking is due partly to the desiccation by heat and partly to the antiseptic action of small amounts of creosote, acetic acid, etc., present in the smoke.

The process consists in first placing the cleaned fish for a short time in brine, or salt and later suspending them on rods in a kiln in which a smoky fire of wood, saw-dust, rice-husk, etc. is burning. Smoking may be cool or hot, heavy or light, long or short according to the type of product desired. Light hot smoking for short period is given when the article is intended for quick consumption.

The process is simple and often the most delicious and tasty product is prepared on a domestic scale by the fishermen and their families. A barrel or a packing case open at the top with a small opening at the bottom for the fire, and with a removable cover and a few spits (rods) on which the fish hang, makes a very good "hot smoking" kiln for small quantities; by placing the fire outside and passing in the smoke by pipe, the same kiln serves for "cool-smoking". For large quantities, any cheap structure through which smoke can freely ascend serves the purpose. (See plate No. 53 facing pages). Hence smoked cure can be conveniently introduced in India if only the public would accept this wholesome preserved food. Properly smoked fish has a golden yellow colour and is very appealing to the eyes but is not very popular in India. At most fishing sites quantities of fish often come too late at night for processing in the Government fish curing yards or in too large quantities

for ordinary handling. Instead of throwing them away as tainted or drying them for fertilizers, they might be turned into palatable food by light smoking. For this process, salting is just a preliminary to smoking and only a small quantity of salt is needed. The fish are safe as soon as they get into the smoke. The process can be carried on even under adverse weather conditions. Experiments conducted in Madras have shown that sardine, mackerel and small seer, pomfrets, Jew fishes, ribbon fish, etc. give excellent results. Hilsa will probably give the best smoked fish which may well stand comparison with the bloaters, red herrings, kippers, etc., of England and the bonito of Japan. To raise smoke, paddy husk, chips and saw-dust from teak, white-cedar, coir husk, etc., can be used; these are available at cheap rates almost everywhere.

(d) *Other methods.*—(i) *Pickling with salt and tamarind.*—Mostly mackerels are cured in this manner and the entire quantity produced is exported to Ceylon. After gutting and washing, salt with a small piece of Malabar tamarind (called Goruka pulli in Malabar) is thrust into the abdomen of the fish. They are afterwards arranged in layers in a barrel with a sprinkling of salt and tamarind between the layers. Heavy weights are placed on the top of the pile and the barrel is temporarily closed. At the end of 3 to 4 days the “self-brine” is run off through a small hole made in the bottom. The fish are found to have shrunk considerably. They are pressed down and the barrel is filled with more fish from other barrels to make good the shrinkage. When completely filled in this manner, the cover is put back into the barrel and the original pickle (brine 1) returned till the barrel is “bung-full”. The proportion of salt is 30 lb. per maund of fish. Each barrel may contain 6,000 mackerels and weigh about half a ton. This type of cure is conducted only in a few yards in the States of Kerala and Mysore.

(ii) *Prawn-curing.*—Prawns are cured by boiling and then drying or by simple sun-drying. The former method is resorted to chiefly during the wet weather. The crustaceans are boiled with water in wide mouthed copper vessels till they become reddish brown. After drying in the sun, the shells are removed by putting them in jute sacks and beating the sacks hard against a block of wood. The kernels are sorted out and once again dried before storage. The shells are in demand as manure. In the second process fresh prawns are simply sun-dried and the shells are not removed from the dry product. Shelling and drying result in a loss of 80 per cent of the weight of raw prawns, while sun-drying unshelled) causes a net loss of only 40 to 50 per cent.

In Orissa, prawns are preserved by spreading them on *thatties* over a quick but smoky fire.

A semi drying process of preserving prawns has been perfected at the Fisheries Technological station, Kozhikode. This process can be adopted on large scale in areas such as Chilka lake, Collair lake etc. where prawns are available. By this method prawns blanched by dipping in boiling water or in a 6 per cent salt solution are shelled and salted by

immersion in saturated brine for about 20 minutes. After draining off the brine, the kernels are dried either in the open air or in a drier. The drying is only partial and is stopped when the prawns are so firm that fairly strong pressure between the thumb and the finger leaves an impression on them. When the product is to be stored for short periods it is put in 1 lb. and $\frac{1}{2}$ lb. alkathine bags and sealed. For storing for longer periods it is packed into tins which are charged with carbon dioxide and sealed. "Semi-dried" prawns before use are immersed in water for about thirty minutes to dissolve the excess salt. The prawns after absorbing water swell and look and taste like fresh prawns. In 1955-56 the Madras Government put into market 6,956 lb. of semi-dried prawns, the wholesale rate was Rs. 1.25 nP per lb. and the retail rate Rs. 1.62 nP per lb.

(iii) *Fish pastes*.—Tamarind fish paste is prepared in Malabar from sea fish. The fish are cut into slices and salted. When dry the slices are treated with a pungent and spicy paste consisting of chillies, mustard, garlic, tamarind etc. prepared in vinegar. In Jalpaiguri, powdered dry fish mixed with crushed stems of caladium (*Kachu*) is made into balls. A paste called *hidal Khunda* is made by Nowgong fishermen from certain small varieties of fish. These are placed in a hole dug in the ground and kept covered for nearly a month. The mass is then dried in the sun, powdered and packed into bamboo tubes. Sometimes, a little ground pepper and some alkaline ash (called "*Khar*" in Assam) is mixed with the paste at this stage. In Assam a favourite fish paste called *shidal sukti* is made from dried fish. These are allowed to soak for a few hours in water and then packed closely in *matkas*, the interior of which has been well smeared with fish oil. Fish oil is also sprinkled between the layers. The jar is sealed and buried in the ground for several months to allow the fish to develop the necessary "taste".

D—Issue of salt for fish-curing

Throughout the world salt is the most important curing agent for fish and other live-stock products, viz. meat, hides and skins etc. Prior to the period when salt became an excisable commodity in this country the fishermen were in the habit of preparing the salt from sea-water—the so-called salt earth—for their home consumption as well as for curing fish. Even after the imposition of a duty, collection of salt earth was permitted in the Malabar and Kanara districts of the Kerala and Mysore States and in the last quarter of the 19th Century the common complaint was that the salt tax had destroyed a flourishing trade in cured fish in Bombay and all along the east coast from West Bengal to Cape Comorin. The report of the Committee on Fisheries in Madras (1929) contains a review of the circumstances which led to the establishment of Government salting enclosures (the present day fish curing yards) for the purpose of supply of salt at a little above the cost price for bona fide curing purposes. The earliest of these enclosures were opened in 1874.

The records on the subject show that the salting enclosures were established in the interests of the public, namely, to provide them with more wholesome salted fish as an article of diet and incidentally to save the Government the trouble, expense and risk of designing and administering measure against the use of salt earth, the collection of which was an immemorial right in certain districts. An institution like the fish curing yards does not exist in any other country.

Since the abolition of salt duty from 1-4-1947 there has been considerable decline in the utilisation of fish curing yards by fishermen, as salt is now generally available in the open market at the same rates as in the Government yards. Further, since salt manufacture on small scale by individuals is now permitted low quality salt has become easily available at very cheap rates. Although the Indian Standards Institute has laid down that salt for curing fish should not contain less than 96 per cent sodium Chloride, there is no effective check against the use of low grade salt. Many fish curers use at present salt earth or salt of very inferior quality. Consequently the quality of fish cured outside Government yards has deteriorated considerably.

The Government of Madras, Kerala, Andhra Pradesh and Bombay subsidise the supply of salt in their fish curing yards to meet this situation, but the extent of subsidy does not usually prove sufficiently attractive to the fishermen.

Till the adequate facilities for cold storage and rapid transport, are available large percentage of the sea fish will continue to be cured all along the coast. Despite the fact that cured fish, as now produced in the fish curing yards, is not as attractive and hygienically prepared as one would wish, curing with salt in a Government yard results in a comparatively more wholesome product than by any other methods of preservation that may be adopted by fishermen in their own homesteads or in private curing yards.

In the curing of fish conducted outside the curing yards set up by the Government the control exercised in the fish curing yards in regard to proportion of salt to be used for curing, restrictions on the use of self-brine etc. are absent. Fish is not washed after gutting and is not kept for sufficiently long time in salt. Curing of fish, if not done under proper supervision would result in the falling of standards and quality of the cured fish. The institution of fish curing yards with a view to raising the general quality and standard of salt cured fish is, therefore, to be encouraged. To make fish curing yards popular, salt should be supplied at rates lower than those prevailing in the local bazars so as to attract more fishermen to come to the curing yards. Recognising this, the Government of India under the "Grow More Food" campaign scheme has been giving subsidy to the extent of 50 per cent of the cost of salt utilized.

E—Note on number, location and size of fish-curing yards

There are in all about 139 fish curing yards in India. The yards deal only in salt cured fish. Each yard is a strongly fenced enclosure, the area varying between half an acre to five acres depending on the quantity of fish caught in the locality. There is only one entrance and the passage to the yard is through a building which has an office room on one side and a salt godown on the other. Larger yards are in charge of Sub-Inspectors of Fisheries and the smaller ones in charge of Petty Yard Officers.

Each yard has a number of curers to whom "tickets" are issued free of cost. The majority of the ticket-holders are fishermen. The number of tickets issued for a yard ranges from 5 to 120. All salting operations are done within the yard, and the ticket-holder has to provide himself with a shed, salting receptacles, mats, etc., for drying the fish. The curing sheds are generally constructed in rows alongside the fence with doors facing the quadrangle, the open space in the middle being used for drying the fish. The State fishery authorities who now control the yards insist that the sheds should be of a standard pattern, and with cemented tanks having rounded sides and bottom for salting the fish.

The fish brought to the yard are weighed first. When too many fish have to be handled, they are measured in baskets of known capacity and the weight calculated therefrom. Salt is then issued for curing. As already stated, the amount of salt to be applied per maund of fish depends upon the size and type of fish, the season (dry or wet weather) and the kind of cure. In the Madras yards the quantities to be issued have been standardized with special reference to the above factors. Salt has to be paid for on the spot; no credit is allowed.

When the curing is over, the salted fish are weighed before they are removed from the yards. The percentage loss in weight that fish undergo during dry and wet salting has been worked out in each yard and the yard officer can thus satisfy himself that salt has been used in the approved manner.

The 15 yards in North Kanara district serve a coastline of 80 miles which is equivalent to a fish curing yard for every 5·3 miles of coast. In the Malabar district of Kerala State there are 46 yards covering a coastline of 90 miles. In the Madras State a number of yards have been closed by the Madras Government and there are now only 11 yards. All the 14 yards in Orissa State which were situated in Ganjam District were closed with effect from 30-6-48.

The quantity of fish cured varies according to the fishing season. In the following table No. 16 the average quantity of fish brought per yard and the average quantity of salt issued during certain years are

given. It will be observed that fish curing is relatively more important on the Malabar coast.

TABLE NO. 16

Table showing the distribution of the fish curing yards and the average quantities of fish salted in them

Name of district or Section	No. of yards	Length of coast line	Year to which the figures relate	Average quantity of fish brought for curing (mds.)	* Average quantity of salt issued (mds.)
<i>West Coast</i>					
1. Ratnagiri district	20	90	1955-56	1,31,318	36305,
2. North Kanara district	15	80	1955-56	1,08,375	20,552
3. South Kanara district	15	150	1955-56	5,38,261	80,601
4. Malabar district	46	90	1955-56	9,13,683	1,33,732
5. Travancore-Cochin area	28	215	1955-56	4,24,285	75,712
<i>East Coast</i>					
1. Vellore Section	2	1,150	1956-57	8,298	5,389
2. Tanjore Section	3		1956-57	16,439	3,207
3. Madurai Section	2		1956-57	14,863	9,022
4. Tuticorin Section	4		1956-57	57,754	13,016
5. Andhra Section	4		1956-57	11,988	1,594
6. Orissa*	14		1947-48	34,654	4,596

*The fish curing yards were abolished due to abolition of the duty on salt with effect from 30.6.1948

F—Note on the manufacture of fish oils

Fish-oils.—The production of fish oils has been well-developed on scientific lines in countries like Norway and the United States of America. Norway, a small country produces about 100 million pound of fish oil and 24 million pound of cod liver oil. United States of America produces twice as much fish body oils as Norway and is also one of the biggest consumers of fish and fish liver oils.

Oils derived from fish can be classified broadly into two groups. In some fish such as sardine, hlisha, brackishema etc. oil is distributed generally throughout the muscles and the flesh, in others which have

lean flesh, viz. sharks, etc. the oils is concentrated in the liver. Oil obtained from the first of these classes, by extraction from the whole fish are generally known as "fish" oil. The other class of fish yield the more valuable medicinal "liver" oil, the therapeutic value of which depends on the presence of Vitamin A in them.

"Fish" oil and guano (the product obtained by drying the cooked fish after oil has been extracted) are made only on the west coast of Kerala State where shoals of oil: sardines appear usually in great abundance from August to June. During the years 1949-50 to 1953-54 the Madras Government produced the following quantity of fish oil.

1949-50	2,407 lb.
1950-51	2,825 lb.
1951-52	2,391 lb.
1952-53	4,276 lb.
1953-54	3,756 lb.

In the Bombay State and in West Bengal and Orissa, etc. very small quantities of crude oil are made from sharks, rays etc. The quantities produced are negligible and the oil is used by the fishermen themselves for their domestic requirements.

From time immemorial, oil sardines have been used either for oil or for fertilizer but in the crudest possible way. The usual method was to obtain the oil by putrefaction of a mass of sardines placed in a worn-out dug-out canoe. It was also a wasteful process, as the residue was thrown into the sea. The oil was of the worst description and odour and was useful only for smearing the planks of country boats so as to make them impervious to water. When fertilizer was desired the procedure was to spread the sardines on the sand of the open beach and dry them in the sun. Large quantities of valuable oil, of no manurial value, were wasted in the process and the product became highly impregnated with sand.

In 1907-08, the Madras Fisheries Department initiated the work relating to preparation of fish oil and after carrying out some experiments recommended adoption of the American practice with necessary modifications. Under this method, the fish are boiled in open pans over a fire and the boiled stuff is then pressed for oil. The pressed scrap is dried in the sun and disposed of as guano. The oil thus obtained is a very valuable marketable product.

The Department also advocated the opening of small factories for the purpose. The move was attended with immediate success and several "Oil and Guano" factories came into existence. These factories are situated within 100 yards from the sea and are equipped with iron cauldrons, presses, cemented tanks, drying yards etc., for the proper treatment of the fish and drying of the cooked scrap. To set up and work a factory for the manufacture of fish oil or guano, a licence has to be obtained from the Local Board Authorities. Such licences are granted only when they are constructed at some distance from inhabited areas and are properly equipped and ventilated.

Fish-meal.—Fish-meal used for feeding cattle and poultry is also manufactured in a similar manner. The operations are conducted with greater care and the cooked fish is dried on a tiled barbecue to prevent any admixture with sand. The fish scrap is then powdered and sieved and the resultant product is “fish-meal”. Fish-meal can be manufactured from all common fishes but very hard bones and excessive oil in the fish are undesirable. The Madras Government produced the following quantities of fish meal during the years 1949-50 to 1954-55 :—

1949-50	8,557 lb.
1950-51	7,020 lb.
1951-52	639 lb.
1952-53	9,374 lb.
1953-54	17,097 lb.
1954-55	12,067 lb.

Recently *in 1955 a “Ferramatic” fish-meal plant of 30 cwt. capacity was set up at Kozhikode. This plant is meant for the manufacture of fish-meal only from lean fish. But “Ferramatic” plants are available for treating fish for oil as well as meal. Ferramatic plant is supposed to be one of the most modern and scientific methods to convert every scrap of waste or offal into a marketable product. The plant consists of (i) pre-cooker, (ii) press, (iii) oil separator (iv) drying cylinders and (v) deodorizer. The small fish which fetch very little price and the excess fish that could not be sold are fed into this machine to recover oil and the meal.

The large bones are broken up and the tissues softened up in a steam jacketted pre-cooker fitted internally with a tabular shaft, to which are attached arms and blades set at an angle to form both a stirring device and a conveyor. Steam is introduced and the mushy material is fed into the press, with a solid tapered warm shaft revolving in a cage. The liquor is strained through, into settling tanks and separators where oil is separated. The press cake contains at this stage 50 per cent moisture and is passed through a drying plant (series of jacketted cylinders), leaving an edible meal which is ground and filled into sacks. The meal so produced does not have a bad odour and the oils is of good quality.

Medicinal fish liver oil.—The use of shark-liver oil as a tonic for wasting diseases was known in India as early as 1850. The method of preparation described by F. Day in his “Sea Fish and Fisheries of India” (1873) shows that all necessary precautions were taken to obtain a really high class product. A summary of the method then followed will be of great interest at the present moment.

“Livers are graded into three recognised grades viz. (1) firm and pinkish (best), (2) firm greyish externally and reddish when cut (medium quality) and (3) flabby whitish externally as well as internally (inferior). The liver is treated within 6 hours of the death of fish and gall bladder removed and the gland thoroughly washed. The glands are next bled by slitting the veins and washed repeatedly with water. Thereafter they are cut into pieces of 4 lb. weight each. Two such pieces are placed in

*Bulletin No. 4 of the Central Leather Research Institute, Madras.

an earthen vessel capable of holding from 4-5 gallons of water. Sufficient water is poured to cover the liver with $1\frac{1}{2}$ inches of fluid. The vessel is placed for 15-20 minutes over a slow fire and at 130°F and the contents stirred up. When frothing commences the vessel is at once removed and placed on sand to cool. The oil floating on the top is skimmed into large glazed earthen ware jars by means of a wooden ladle. The crude oil is then filtered through flannel and the residue rejected."

The main centre of production was Kozhikode (Calicut), where manufacture was initiated in 1854 and during certain years over 5,000 lb. were produced annually. About the year 1870, however, cod-liver oil began to be imported into India at a price lower than the Indian fish liver oils, and the Indian industry began to languish. The stoppage of imports of cod-liver due to the World War II and the necessity for a cheap oil containing Vitamin A led to the revival of this indigenous industry. Medicinal oil from sharks and saw-fishes is being produced once more in Kozhikode (Calicut). The Governments of Bombay, West Bengal, Kerala and Orissa are also encouraging the industry.

Shark livers are preserved in Soda ash along the coast of Kerala and Mysore while in Madras State, the livers are brought by the fishermen to the nearest fish-curing yards, where they are cleaned, washed and boiled in open tin-coated copper pans, with water. For raw livers fishermen receives anything from 12 nP to 37 nP per lb. The crude oil extracted is sent to the Government Oil Factory at Kozhikode (Calicut). Sixty fish-curing yards on the east and west coasts have been provided with equipment for extraction of the oil and the yard officers have been given the necessary training.

Thirty seven species of sharks and 32 species of skates and rays have been recorded in Indian waters. The sharks vary in size from a foot to about 20 feet and the livers also accordingly vary from a few ounces to four hundred pounds in weight. The most profitable sharks with regard to Vitamin A contents are *carcharhinus melanopterus*, *Sphyrna*, *Pristis Microdon* and *Galcocerdo* oil yield and Vitamin A content are in inverse relationship.

The Vitamin A and oil contents of these livers show wide variations. The Vitamin A potency may be anywhere from a 1,000 I.U. to 353,000 I.U. per gram. The Indian shark livers offer a rich source of Vitamin A and the oil content is also as high as 80 per cent. Analysis of the Indian fish liver oils have shown that, on an average, it contains 10,000 I.U. of Vitamin A per gram, *i.e.* 10-16 times as much as the average imported cod-liver oil. Hence, before putting the oil in the market, it is blended with refined groundnut oil in suitable proportion to bring down the Vitamin A potency to about 1,500 I.U. that prescribed in the British Pharmacopoeia for medicinal cod-liver oil. "Concentrates" of the oil (Adamin in Kerala and Elamin in Bombay) are also being put on the market. During the year 1954-55, 75,168 lb. of shark liver oil were produced and in the year 1955-56 the production increased to 82,856 lb. Vitamin A potency of the high potency oil as well as that of the blended oil are constantly tested.

In the Bombay State, the production of shark liver oil increased from 153,470 lb. in the year 1952-53 to 2,12,541 lb. in the year 1955-56. The livers are boiled by the fishermen and the Oil Chemist attached to the Department of Industries tests such samples as are sent to him for Vitamin A. This service is rendered free and a certificate is given to the fishermen. The raw oil is understood to find ready sale in the Bombay market and the pharmacists who buy the oil do the necessary blending and marketing. In West Bengal, 10,921 lb. were produced in the year 1955-56. In Orissa State about 2,000 lb. of shark liver oil were produced annually before 1955-56. The production in the year 1955-56 was, however, as high as 7,000 lb.

The industry has a great future and must be put on a firm footing in order that our country may become self-sufficient in the production of this valuable medicinal oil.

G—Note on the manufacture of shark fins and insinglass (fish-maws)

(a) *Shark fins*.—The fins of large sharks (excepting the caudal) are cut near their roots, washed in sea water, dusted with a mixture of hot wood ashes and slaked lime and dried in the sun or smoked according to the prevailing weather conditions. The cured product, which is crisp and brittle, is exported to China and other countries in the Far East. The soap prepared from the cartiligious rays in the fins is considered to be a delicacy by the Chinese and in the Philippines. If the processing of fins to prepare the edible product can be undertaken as a cottage industry, the income from the source can be considerably increased.

(b) *Isinglass (fish-maws)*.—Isinglass is obtained from the air-bladder (termed “sounds”, “maws”) of several species of sea, estuarine and fresh-water fish. The term was originally applied to the stuff obtained from the sounds of the Russian fish sturgeon.

In India the air bladders are those obtained from perches, the Indian salmon, jew-fishes, eels and certain varieties of cat-fishes. In Bombay, on the east coast of Madras and in the Sunderbans, fishes of the first group pre-dominate, while south of Bombay and all along the Kerala coasts cat fishes are abundant. The superior quality maws are tongueshaped, whereas those from cat-fishes are of the form of rounded bags with an open mouth. After they have been removed from the fish the air-bladders are slit open, washed in sea-water and sun-dried and prepared for export. The trade in air bladders is mainly concentrated on the Gujarat and Saurashtra coasts in Bombay State. Unfortunately no effort has yet been made to refine the product for the export markets.

Isinglass is used in the clarification of wine and beer. It is also used in cooking and as a substitute for gelatine in confectionery, for the preparation of special cements and as a constituent for special water-proofing composition.

(c) *Clams*.—The shells of clams and other molluscs form the raw material for the manufacture of lime in many areas of the country. The

window pane oyster shells and other shells are also being utilised for making various fancy articles such as fancy table lamp, ash trays, etc. on a cottage industry basis.

H—Cost of preparation for the market

In the case of fresh fish intended for local consumption, no special expenditure is incurred as gutting is not practised in the coastal areas. Fish merchants simply remove the entrails and clean the fish which they send packed in ice.

In the case of curing, however, large quantities have to be handled and there are a number of items of cost. The items are (a) cost of transport from the beach or landing centre to the curing or processing yards, (b) cost of gutting and cleaning, (c) cost of salt and salting and (d) cost of drying. Of these gutting charges, salting expenses and the quantity of salt used, vary according to the size of the fish and the locality where the curing is done.

The approximate cost of curing one maund of raw fish in the different States is given in the following table.

TABLE No. 17
Approximate cost of curing one maund of raw fish
(Data relates to 1957)

Name of State and type of curing	Transport Charges		Gutting and cleaning charges		Cost of salt	Salt-ing charges	Dry-ing or labour charges	Total cost	
	From	To	From	To				From	To
	Rs.nP	Rs.nP	Rs.nP	Rs.nP	Rs.nP	Rs.nP	Rs.nP	Rs.nP	Rs.nP
<i>Madras—</i>									
Pit-curing (Tuticorin)	0.25	0.37	0.25	0.37	0.16	0.25	0.25	1.16	1.40
<i>Kerala—</i>									
Dry-salting (Tanur)	0.19	0.25	0.12	0.25	0.31	0.12	0.12	0.86	1.05
Boiling and Drying Prawns (Porrani)	0.12	0.16	..	..	0.12	0.12	0.75	1.11	1.15
<i>Mysore—</i>									
Pickling in Barrels (Malpe).	0.25	0.37	0.37	0.44	0.44	0.12	12.00*	13.18	13.37
<i>Bombay—</i>									
Sun-drying	0.25	0.50	0.50	0.75	..	..	1.50	2.25	2.75
Wet-salting	0.25	0.50	0.50	0.75	0.87	0.50	1.50	3.62	4.12
<i>West Bengal—</i>									
Sun-dried (Bombay Duck).	50 nP. per maund (approximate) from catching to curing side at Jaunput.		Rs.1.50 per maund at Jaunput.		50 nP. (4 seer. rs @ 0.12 nP. per seer)	..	1.00	3.50	..

*Cost of barrel and tamarind included.

The cost of treating one ton of fresh sardine for the extraction of oil is as given below :—

(Relate to the year 1957)

Transport to the factory	Rs. nP.
30 baskets	3.75
Fuel	2.00
Labour charges for boiling and processing (Two Labourers @ Rs. 2/- each)	4.00
Labour charges for separating the oil and drying scrap (3 labourers @ Rs. 2/- each).	6.00
TOTAL	15.75

The cost of treating 100 lb. of shark liver yielding about 4.25 gallons of medicinal oil in Kerala is reported to be rupees four—Rs. 2 for fuel and Rs. 2 for labour—in 1957. Similarly the cost in Bombay works out to be Rs. 5.43 for refining 100 lb. of crude shark liver oil yielding about 4 gallons of pure oil as under :—

	Rs. nP.
Cleaning charges	0.62
Fuel etc.	2.00
Cooly charges for skimming and filtering oil etc. (3 Coolies for 3 hours)	2.81
TOTAL	5.43

CHAPTER V—DEMAND AND UTILISATION

Fish in one form or the other, has been used as an article of human diet since pre-historic times. Being a rich and palatable food, it has always been highly esteemed. Researches on dietetics have shown that fish proteins are easily and completely digested and that fish fat is usually rich in Vitamin A. Vitamin A is required for growth, for good vision and for increasing resistance towards disease.

A comparative statement of caloric value of fish and other food articles is given below :

Name of the food stuff	Caloric value per 100 gms.
1. Beef	114
2. Mutton	194
3. Fowl	227
4. Fish	193
5. Eggs (hen)	173
6. Eggs (Duck)	180

It will be seen from the above figures that next to fowl and mutton, fish is at par with other food articles in caloric value.

A—Demand

(1) *Per capita consumption of fish and fish products.*—Customs, religion and prejudice play a big part in determining the demand for fish. For instance, in the Punjab fish is not very popular, although there is no religious taboo against it. On the other hand in Kerala, Andhra Pradesh, Bombay (except Saurashtra) Mysore and Madras, fish is very largely consumed, whilst in West Bengal, Orissa and Assam and Bihar, a very great proportion of the people would eat it if they could obtain it cheap. In the hilly districts fish is almost universally eaten when available. Taking India as a whole, Brahmins (except the Kashmiri *pandits* and residents of West Bengal and certain portions of Bihar) certain sections of caste Hindus e.g. Bhabras, Vaishnavas, followers of Siva, Deva Samajists etc. Jains and Budhists, totally reject fish as food. In the interior of the country, fresh fish (local fresh water fish or sea-fish) is a luxury even for the middle class people and sun-dried or cured fish is not very popular with the majority of the consumers.

The net available supply and consumption in various States have been given in the following table. The *per capita* consumption of fish has been estimated for each State separately.

TABLE NO. 18

Estimated per capita consumption of fish in different States in India

(Thousand Numbers)

State	Quantity of fish available for consumption (Thousand metric tons)	Estimated Population during 1956		Per capita consumption of fish*	
		Total population	Estimated number of persons who have no objection to eat fish	On the basis of the total population lb.	On the basis of number of persons who have got no objection to eat fish lb.
Andhra Pradesh .	82.97	33,566	22,787	5.54	8.16
Assam	8.20	10,040	6,733	1.83	2.73
Bihar	37.30	40,426	26,775	2.07	3.12
Bombay	340.11	54,741	31,724	13.92	24.01
Delhi	1.10	2,348	1,497	1.05	1.65
Himachal Pradesh .	0.20	1,141	784	0.39	0.57
Jammu & Kashmir	0.70	4,661	3,280	0.34	0.48
Kerala	158.70	15,549	10,942	22.86	32.49
Madhya Pradesh .	3.50	27,355	16,985	0.29	0.46
Madras	80.59	32,199	21,326	5.61	8.46
Mysore	76.74	23,145	14,946	7.43	11.50
Orissa	28.85	15,200	10,445	4.25	6.19
Punjab	0.40	17,505	12,173	0.05	0.07
Uttar Pradesh . .	6.60	67,610	41,421	0.22	0.36
West Bengal . . .	45.45	28,816	21,471	3.53	4.74
Others**	1.30	18,662	11,655	0.16	0.25
Total	872.71	392,964	254,944	4.97 (Average)	7.67 (Average)

or
2.25
k. gms.

or
3.48
k. gms.

*Includes fresh fish and fish-products.

**Relates to Rajasthan, Manipur and Tripura.

It will be observed from the table on pre page that the *per capita* consumption of fish in India as a whole is estimated to be 4·97 lb. (2·2 kilograms) per annum, as compared to 3·36 lb. (1·53 kilograms) estimated in 1949. The *per capita* consumption in different States on the total population basis, however, varies widely between 0·05 and 22·8 lb. In the producing areas, the *per capita* consumption is relatively higher than the other areas as fish is available at cheap prices all the marine and most of the fresh water fishing centres. The *per capita* consumption is high in maritime States being the highest in Kerala i.e. 22·86 lb. followed by Bombay with 13·92 lb. Amongst the non-maritime States, Bihar leads with *per capita* consumption of 2·0 lb. followed by Delhi with 1·05 lb. The consumption in Punjab the lowest being 0·05 lb.

The *per capita* consumption in India is low when compared with the *per capita* annual consumption of fish in other countries as shown below :—

							(In pounds)
1	United Kingdom	.	.	.	.	.	40
2	Denmark	.	.	.	.	.	24·00
3	Germany	.	.	.	.	.	18·22
4	France	.	.	.	.	.	18·00
5	U.S.A.	.	.	.	.	.	15
6	Italy	.	.	.	.	.	11·00
7	Switzerland	.	.	.	.	.	6·6
8	India	.	.	.	.	.	4·97

(2) *Per capita consumption in urban areas.*—In urban areas where people are comparatively well to do, the demand for fish also is higher. Regular trade in fish exists mostly in the urban areas. The following table gives comparative figures (estimates) of *per capita* consumption of fish in urban areas and in the corresponding States.

TABLE NO. 19
Per capita consumption of fish in urban areas

Name of the City	<i>Per capita</i> consumption (lb.)	Corresponding State consumption (lb.)
1. Calcutta	12·7	3·53
2. Madras	6·5	5·61
3. Bombay	16·7	13·92
4. Delhi	1·5	1·05

Enquiries have shown that in every State there is hardly any town which does not receive some supply of fish, however, small, for consumption while there are vast tracts of rural areas where no fish is ever seen.

B—Utilization

(1) GENERAL

Fish is utilized both for food as well as for the manufacture of products like manure, guano, fish oil etc. Fish used as food may be classified under two heads viz. fish used in the fresh condition and that used in the form of preserved products.

Estimates of the quantities utilized for various purposes in different States may be seen in the Appendix XIII of which the following is a summary.

TABLE NO. 20

Utilization of fish in India

(Based on average annual production for the five years ending 1957)

Type of fish products	Annual quantity (thousand metric tons)	Percentage to total production	Percentage to total quantity converted into products
1. Consumed as fresh fish	409·03	47·9	..
2. Converted into sun-dried fish . .	197·74	23·2	44·6
3. Converted into salted fish . . .	174·59	20·5	39·4
4. Converted into fish manure etc. .	71·35	8·4	16·0
TOTAL	852·71	100·0	100·0

It will be observed from the above figures that 91·6 (47·9 per cent as fresh and 43·7 per cent as dry) per cent of the total production is utilized for edible purposes and only 8·4 per cent for the manufacture of industrial or other products. The latter includes preserved fish originally intended for human consumption but which owing to unsatisfactory drying or long storage have become unfit for human consumption.

(2) CONSUMPTION AS FRESH FISH

The proportion of the total production which is consumed as fresh fish varies widely in different States. In maritime States the supply is almost entirely from fresh water and most of the fish is consumed as fresh fish.

The different varieties are held in various degrees of estimation in different areas. Sharks and other cartilaginous fishes are popular in the Southern parts of the Bombay State and generally all over Madras State but there is a poor demand for these varieties in Bombay city and in West Bengal in general. Cat-fishes and eels which possess no scales are rejected by Jews and Shia Muslims. There are also local peculiarities which account for the popularity of particular varieties. For instance, hilsa caught in brackish waters in the estuaries of West Bengal are usually better priced than those caught higher up in the Ganga. Urban consumers prefer fish with clean appearance, firm flesh with the minimum of small bones and good taste. For this reason pomfrets, seer fishes, mullets, beekti, Indian Salmon, soles and prawns among marine fishes and hilsa, carps and 'live' fishes among fresh water, are greatly in demand. Magur, murrels, climbing perch and other species which are marketed alive are considered very nourishing and are specially in demand in certain areas. A peculiarity about Indian consumers is that those accustomed to eating fresh water fish have no liking for sea-fish and similarly those accustomed to sea-fish seldom go in for fresh-water fish. In India fish is cooked and eaten as fish-curry with rice and *chappaties*. It is also consumed after being fried in fat (Ghee or oils) along with other vegetables.

Points for judging freshness.—Highly technical methods exist to determine the freshness of fish, prawn and crab accurately in a laboratory but these cannot be adopted by common man who judge freshness by visual examination. The criteria by which freshness of the fish could be determined while purchasing them in the markets, are indicated below :—

Fresh fish	Stale fish
1. Odour may vary in different species but in general it is fresh and pleasant.	1. Odour varies from a slightly unpleasant smell to one of nauseating putrefaction.
2. Eyes are full, bright and perfectly fresh in appearance; pupil jet black and convex; Cornea transparent.	2. Eyes sunk and shrunk and covered with slight to thick slime which is yellowish in colour; pupil loses its blackness as staleness advances and milky white pupil is an indication that the fish is dangerously putrefied.
3. Gills are bright red in colour, clean, free from slime and offensive odour.	3. Gills are discoloured, usually dark brown. If dirty white, the fish is in an advanced stage of putrefaction.

Fresh Fish	Stale Fish
4. Flesh firm and elastic to the touch. Fillets white or bluish-white and translucent; adheres firmly to the bone and difficult to tear; blood red in colour.	4. Flesh soft and limp; flabby and pits on pressure. Fillets red along the backbone; easily torn from the bone; blood brown or chocolate in colour.
5. General appearance is clean and bright, smooth and glistening; moist with transparent slime; no discoloration in abdominal walls.	5. Stale and lifeless in appearance; dry and rough to the touch with a gritty feeling; various degrees of brown, red or bluish discoloration of the abdominal walls.

Fresh crab

Bright appearance; claws and tail firm; no objectionable smell when tail is raised.

Stale crab

Bleached appearance; limpness of claws and tail; objectionable smell when tail is raised.

Fresh prawn

Dry and crisp to feel and gives off a pleasant odour.

Stale prawn

Moist and clammy, possibly warm and sticky; smell objectionable.

(3) UTILIZATION AS SUN-DRIED FISH

As much as 23·2 per cent of the total production of fish is marketed in the form of sun-dried fish. The proportion of the total catch which is sun-dried varies considerably in different areas. Small marine fish can be satisfactorily preserved by drying and hence sun-drying is more common in the maritime States. As regards fresh water fish, sun-drying on a commercial scale is resorted to only in Assam and certain parts of West Bengal. In the coastal areas, where fresh fish can be obtained cheap, there is practically no demand for dried fish, except during monsoons.

(4) UTILIZATION AS SALTED-FISH

It is estimated that nearly 20·5 per cent of the total production of fish are cured by salting in some form or other. The varieties in demand for the preparation of salted fish are sardines, mackerels, seer-fishes, cat-fishes, pomfrets, sharks soles, prawns etc. For the preparation of wet-salted fish and for brine pickling for export to Ceylon, mackerels are preferred while for making other pickles, tamarind fish etc. seer fish are popular. In Assam for the manufacture of "Shidal Sutki" 'Punti' fish is used. Prawns intended for export to Burma are usually salted and shelled before despatch. Salted pomfrets, seer, soles and to some extent cat-fishes are consumed by the middle classes, while the other varieties are mostly eaten by the poorer classes in the interior of the country.

The kind and quality of curing depends upon the demand of the markets. It is observed that fish intended for export is better cured than that intended for domestic consumption. In certain areas, products with distinct smell obtained by different methods of curing followed in some regions are in demand e.g., the pit-cured moist salted fish known as "Mudura cured fish" is in demand in the Southern districts of the Madras State, the "Ratnagiri" cured fish in the cotton tracts of the Bombay State, the "Hidal khuda" of Nowgong and "ba-Lee-Chong" of Chittagong in certain parts of West Bengal and Assam.

(5) UTILIZATION AS MANURE

The quantity of fish used as a fertilizer varies from year to year and depends upon the appearance of shoaling varieties in the coasts of India. The total quantity of fish utilized as manure is estimated at 71·35 thousand metric tons or 8·4 per cent of the annual production.

The use of fish as a manure is an established practice and in some of the maritime States. In view of the high nitrogen and phosphatic content of fish manure, its utilization is becoming more and more popular. There are three kinds of manure obtainable from fish, namely, fish manure, prawn manure and fish guano. More important as manure is fish which is unfit for food and is dried on the sands of the beach. This manure is known as "Beach" manure. Horse mackerels, mackerels, sardines and Jew-fishes are utilised for this purpose. "Beach" manure ordinarily available in the market contains about 5-7 per cent nitrogen and phosphorous and up to 15 per cent of sand and so when mixed with ash forms a complete manure. It is largely in demand for use as a fertilizer in coffee and tea plantations. "Prawn manure" consists of the head, tail and body shells of prawns, which are separated during the process of preparing prawn pulp or semi-dried prawns. This generally contains 5 to 6 per cent of nitrogen, 3 to 4 per cent of phosphates and an appreciable quantity of lime. It decomposes rapidly and has been found to be suitable for acid soils. "Fish guano" is the product left after sardines are cooked and pressed for oil. Fish guano has been found to contain 8 to 10 per cent of nitrogen and phosphates. Being well cooked, it disintegrates and mixes with the soil quickly and is easily assimilated by the growing plants. It is believed to be 15 to 20 times richer than ordinary cattle manure. Fish "guano" is used in the tea and coffee plantations of Mysore and the Nilgiris.

(6) MANUFACTURE OF OTHER PRODUCTS

(a) *Fish-maws (or Isinglass).*—Reliable statistics showing the production of fish-maws and sharkfins separately are not available. Air-bladders of certain fishes like Jew-fish and eels are also in demand for export. The air-bladder is carefully removed from fish and dried in the sun. It is sometimes pulled into shreds and then dried in the sun after mixing it with some preservative. The trade in air-bladder is mostly concentrated on the Gujarat and Saurashtra coast of the Bombay State. The air-bladders are exported for preparation of Isinglass used for clarification of wines.

The following table shows the variety of fish from which the air-bladder is obtained and their prices in the producing and consuming centres.

TABLE NO. 21
Prices of air-bladders (1957)

Variety of fish from which the air-bladder is obtained	Prices at producing centre (per maund)	Prices at purchasing centre, Bombay (per maund)
1. Cat fish	Rs. 24 to Rs. 30	Rs. 42 to Rs. 48
2. Jew fish	Rs. 140 to Rs. 160	Rs. 270 to Rs. 300
3. Eel	Rs. 90 to Rs. 100	Rs. 120 to Rs. 130
4. Dara	Rs. 150 to Rs. 200	Rs. 300 to Rs. 325
5. Koth	Rs. 150 to Rs. 200	Rs. 300 to Rs. 325

(b) *Shark-fins*.—The fins of sharks are in demand in China where they are used for the preparation of soups. Soup prepared from Shark fins is a delicacy in some foreign countries. Hence shark fins are mainly exported. The prices of shark fins of the different varieties are given below in table.

TABLE NO. 22
Prices of shark fins (1957)

Species	Prices at producing centre (per maund)	Price at purchasing centre, Bombay (per maund)
1. Rhynchobatus	Rs. 320 to Rs. 400	Rs. 480 to Rs. 500
2. Carcharius Linbatus	Rs. 20 to Rs. 30	Rs. 40 to Rs. 60
3. Cimclanoptum	Rs. 160 to Rs. 200	Rs. 240 to Rs. 250
4. Sphyrma Zygaena	Rs. 160 to Rs. 200	Rs. 250 to Rs. 300

(c) *Fish-oil*.—Fish oils may be distinguished into body oils and liver oils. The oil extracted from the whole body of fish or from fish offal is termed fish body oil while fish liver oil is extracted from only the livers of certain fishes like cod or sharks. Generally fish which have a large content of oil in their bodies, have lean liver and *vice versa*. The composition and uses of these oils differ considerably.

Fish body oils are used in industries for the manufacture of fish oil insecticidal soap, leather dressing, soap and candle making, batching jute and tempering steel. Small quantities of body oil are also used for caulking boats to protect them against sea rot. In some parts of West Bengal and Assam, body oil prepared from 'Punti' fish is also used as a crude illuminant.

Fish liver oils are mainly prized for their Vitamin A and D content and, therefore, fetch higher prices as medicinal oils.

(d) *Fish-meal*.—Fish-meal is a cleaned, cooked and dried, ground tissue of undecomposed whole fish or parts of fish. It differs from fish manure in having very little sand and moisture content and pleasant odour. Fish-meal is prepared on a small scale in Bombay, Kerala and Mysore. The chief raw materials used are sardines, mackerels, ribbon fish, silver bellies, etc. The ideal method of manufacture consists of cooking the fish with sufficient water in boiling vats either on open fire or on the steam. The entire mass of cooked fish is then thrust in screw pressers to remove moisture and the resultant cake is dried in the sun, taking necessary precautions to prevent admixture with sand. Prawn offal is also converted into meal. The common methods in vogue in India, however, are very crude resulting in poor quality. Even dried fish are powdered and passed for fish-meal.

The low quality products which are exported to foreign countries are said to be used for blending with high quality fish-meal. Imposition of quality standards was, therefore, found necessary and the following specifications were introduced by the Government of India with effect from 1st April, 1959.

Protein	45 per cent minimum
Moisture	12 per cent maximum
Insolubles	7 per cent maximum
Fat	7 per cent maximum
Salt	7 per cent maximum
Size	1/4" (Particle size)

Fish-meal is generally used as poultry and cattle feed. The quality of the meal will depend on the care bestowed during the preparation and it is expected that the restrictions imposed in the form of quality control would enable the trade to take the necessary steps to improve the methods of production including mechanisation on a cottage industry level. At present there are very few mechanised fish meal plants and one of them is in Kozhikode which produces about 25,000 lb. per annum.

(7) DEMAND AND UTILIZATION OF MINOR SHELL FISH

Shell fish *e.g.* crabs, clans, lobsters, oysters, turtles etc. are caught in small quantities in most parts of the coastal area. There are considerable possibilities of utilizing shell for making various fancy articles on a cottage industry basis.

In the Madras State Oyster shells are powdered and sold by the Fisheries Department as 'Shell grit' for feeding poultry. Edible oysters are also supplied on demand. Though lobsters fetch a high price in some markets they do not find favour in other parts of the country. Crabs are in good demand in large towns. The green sea turtles (*Chelone mydas*) caught around the Palk Bay are mostly "shipped" alive to Ceylon where there is a good demand for them. The leathery turtles (Marine) caught in Travancore and the South Madras Coast are used exclusively for the preparation of the turtle oil.

(8) DEMAND FOR BY-PRODUCTS

(a) *Prawn manure*.—During the manufacture of shelled prawns, prawn dust is obtained as a by-product and is largely used as a manure. It is considered most suitable for acid soils.

(b) *Shell for lime-burning*.—The shells of clams, oysters and various other marine animals yield excellent lime on calcination. The lime can be used in the manufacture of bleaching powder. No estimate is available regarding the quantity produced in the country but production is believed to be quite considerable.

(c) *Pit manure*.—The fish-offal, particularly the refuse obtained by gutting and cleaning fish prior to its being cured in the curing yards is put in pits and allowed to decompose. The production of this pit manure is, however, small, owing to the difficulties of packing and transport. Its use is confined to local areas.

C—Seasonal variations in demand

(1) SEA-FISH

Sea-fish is consumed all the year round in the coastal areas. But a seasonal factor can be noticed in the demand during the different months. For instance, when prime food fishes such as pom-frets, seer, hilsa etc. are available, the urban markets usually reject bony

varieties. The monthly variations in demand as determined by arrivals of fish in some of the important consuming centres are given in the table below:—

TABLE NO. 23
Monthly arrivals of fish in certain markets

	Arrivals in Madras		Arrivals in Bombay		Arrivals in Calcutta and Howrah markets	
	Quantity in Maunds	Percentage	Quantity in Maunds	Percentage	Quantity in Maunds	Percentage
January . . .	22,658	8·9	67,200	7·5	1,46,879	12·5
February . . .	22,824	9·0	70,000	7·8	1,29,220	11·0
March . . .	22,843	9·0	70,000	7·8	98,164	8·3
April . . .	19,951	7·8	61,600	6·9	61,098	5·2
May . . .	20,298	8·0	64,400	7·2	68,411	5·8
June . . .	22,000	8·6	47,600	5·3	96,269	8·2
July . . .	25,390	10·0	67,200	7·5	87,595	7·4
August . . .	24,585	9·6	56,000	6·2	86,608	7·3
September . .	12,802	5·0	86,800	9·7	1,05,077	8·9
October . . .	21,499	8·4	112,000	12·5	1,03,370	8·8
November . .	20,194	7·9	112,000	12·5	84,844	7·2
December . .	19,801	7·8	82,200	9·1	1,11,082	9·4
TOTAL . . .	254,845	100·0	897,000	100·0	11,78,617	100·0

Data relates to 1956.

It will be observed that arrivals in Madras are high during January to March and July and August; at Bombay the arrivals are high during September to December and in Calcutta September to February.

(2) FRESH WATER FISH

In the interior, climatic conditions determine the supply. wide variations in demand occur from State to State and even from district to district in the same State, as can be seen in the Supply Chapter in the table No. 9 "Availability of fish in certain areas".

(3) CURED FISH

The table below gives the quantities of fish cured in the Government Fish curing yards on the west coast of Mysore and Kerala States during different months in the year 1956-57.

TABLE NO. 24

Fish cured in certain Government Fish Curing Yards

	South Kanara		Malabar		Travancore-Cochin	
	Quantity in mds.	Percentage to total	Quantity in mds.	Percentage to total	Quantity in mds.	Percentage to total
1	2	3	4	5	6	7
April 1956 . .	2,495	1.1	12,567	1.7	7,731	3.0
May 1956 . .	3,770	1.4	10,172	1.3	9,353	3.6
June 1956 . .	2,368	1.0	18,599	2.4	14,642	5.7
July 1956 . .	6,987	2.9	37,902	5.0	17,408	6.8
August 1956 . .	9,285	3.9	51,516	6.8	41,229	16.0
Sept. 1956 . .	43,147	18.1	197,028	25.9	29,814	11.6
Oct. 1956 . .	64,492	27.1	109,335	14.4	23,785	9.3
Nov. 1956 . .	45,443	19.1	42,926	5.6	34,941	13.6
Dec. 1956 . .	25,377	10.6	136,935	18.0	24,272	9.4
Jan. 1957 . .	17,823	7.5	51,343	6.8	32,009	12.5
Feb. 1957 . .	3,759	1.6	58,933	7.8	9,653	3.8
March 1957 . .	13,502	5.7	32,656	4.3	11,991	4.7
TOTAL . .	238,448	100.0	759,912	100.0	256,828	100.0

It will be observed that curing is heavy from September till the end of January; nearly 70 percent of the annual total curing is accounted for during these months.

CHAPTER VI—PRICES

A—General

Reliable price records for fish are not available for any fishing area in this country. The trade in the early stages, is in the hands of illiterate fishermen producers who do not maintain any records. Even curers and merchants in the urban markets do not maintain satisfactory price records. A comprehensive analysis of this subject is also rendered difficult due to variations in type, quality, size, weight, etc. of fish, all of which have a bearing on prices. Being a perishable commodity, uniformity in regard to the above factors between the catches landed in different areas is not to be expected. The basis for pricing and the unit of quotation, therefor, vary from place to place. In the wholesale trade, hardly any sorting is done and as such separate prices are not available on the basis of varieties or sizes, *e.g.* large, medium and small. The recorded figures at some municipalities are not of much use as they are generally retail prices. In recent years some of the State Governments have, however, started publishing the prices in their "Price Bulletins" giving only prices of few commercially important fishes.

Prices for sea-fish in the coastal area of Madras and Kerala have been calculated from records of the estimated catches and values of the economic varieties, maintained by the Madras Fisheries Department. Prices in other States have been compiled with the help of information collected during the marketing survey from fishermen, the fish trade and the "Price Bulletins" of the State Governments. Under the circumstances, it has been possible to indicate only in a general way, the seasonal variations, trends and other variations in prices in the sections that are given below.

B—Units of sale and basis of price quotations

In the primary markets fish is never weighed. According to varieties the fishermen offer their catches in small lots or in heaps. The buyers, however, are reported to mentally estimate the weight of any lot before offering a price. Fish sold by auction in most of the terminal markets are also not weighed. Sea-fish in coastal areas are seldom weighed in retail trade while in the interior, both sea and freshwater fish, sold in cut, are retailed on the basis of weights. Units adopted for cured fish are often different from those in use for fresh fish.

The table No. 25 below shows the units of sale and basis of price quotations according to types in the chief markets in some States.

TABLE No. 25

Units of sale and basis of price quotations

Area	Varieties	Units of price quotation		Equivalent in standard weights
		Wholesale	Retail	
1	2	3	4	5
Punjab	All varieties	1. <i>Fresh fish</i> Rupees per standard maund.		In some places the local maund of 16 seers is also employed.
		Rupees per	Rupees per	
Bombay— (a) Ratnagiri	Mackerel	Rupees per <i>hazari</i> .	Rupees per fish.	<i>Hazari</i> =1,050 fish.
	Jew Fishes (Medium size).	Rupees per <i>sekda</i> .	Ditto.	<i>Sekda</i> =100—105 fish.
	Bombay Duck	Basket measures.	Rupees per score.	1 measure=25 seers approximately. 1 score=22 fish.
(b) Thana District	Clams, Oysters etc.	Per Basket measures.	Do	1 measure=10 seers approximately.
Bombay	(1) Indian Salmon, Jew Fish.	Rupees per fish.	Rupees each.	
	(2) Pomfret (silver white).	Rupees per 22 pieces.	Rupees per pair.	
	(3) Pomfret (Black seer & Hilsa).	Rupees per 22 pieces.	Rupees each.	
	(4) Mullet & Prawns.	Rupees per basket.	Rupees per dozen.	Basket=100 lb.
Kerala— Malabar District.	Sardine, Mackerel, horse-mackerel and silverbellies (when shoaling).	Rupees per <i>kalli</i> .	Rupees per heap.	1 <i>kalli</i> =508 standard maunds approximately. <i>Kalli</i> means receptacles formed by laterally portioning the hold of a fishing boat with bamboo chicks.
	Mackerel	Rupees per 1,000.	Rupees per dozen.	1,000 mackerel=2·5 maunds.

TABLE NO. 25—(contd.)

1	2	3	4	5
	Sardine, silver-bellies and soles.	Rupees per lakh.	Rupees per dozen	1 lakh of fish = 200–300 maunds. (The fish are actually measured in baskets and the number computed after counting the fish in baskets.)
Madras— All along the Madras coast line.	Seer, pamfrets, Cat-fishes, Jew fishes, mullets, small sharks etc.	Rupees per 100 fish.	Annas per fish.	Weight depends upon the size of the fishes.
	Large sharks, Jew fishes beekti, Indian Salmon etc.	Rupees per fish.	Also sold on cut as annas per lb.	Do.
Mysore	Small-cat-fishes	Per Basket measure.	Rupees per head.	1 measure = 12·18 seers.
	Anabas sandens, eels, "Live", fishes, carps, Cat-fish, etc.	Per 100 or 1,000	Annas per fish.	Weight depends upon the size of the fish.
Orissa— (a) Cuttack, Puri & Kujang area.	All large varieties weighing over 2 seers.	Rupees per Kalki maund.	Rupees per local seer.	1 md. 40 seers of 105 tolas.
	Prawns & small varieties.	Rupees per basket. Also sold in heaps.	Do.	Do.
(b) Balagan	Estuarine varieties	Rupees per whole catch in a net.	Rupees per seer.	
(c) Balasore	All varieties	Rupees per standard maund.	Rupees per seer.	
West Bengal— Calcutta	Crab	Rupees per 20.	Annas per pair.	
	All varieties except mango fish, labsters and oysters.	Rupees per standard md.	By weight on cut, or in small heaps according to varieties.	Mango-fish, lobsters etc. are sold as rupees per 100.
Assam— Shillong	All varieties	Rupees per standard maund.	Rupees per seer.	
Gauhati & Golakganj.	Do.	Rupees per heap.	Rupees in counts.	

TABLE NO. 25—(contd.)

1	2	3	4	5
		2. Preserved fish		
Bombay— (a) Thana District.	Pomfret	Rupees score. per	Annas fish. per	Score=22 pieces.
(b) At Sewri and Ratnagiri District.	Sardine, mackerel, & other shoaling fishes.	Rupees <i>Kandi</i> . per	Rupeess heap. per	1 <i>kandi</i> =8 maunds.
	Bombay Duck	Per <i>chakki</i> or round.	Annas dozen. per	The fish are tied into round bundles called <i>chakki</i> . 1 <i>chakki</i> =4,000 fish.
Kerala— West coast	Sundried or salted sardine mackerel & other shoaling fishes.	Rupees <i>thulam</i> . per	Annas fish. per	1 <i>thulam</i> =16 seers at Cannanore. 1 <i>thulam</i> =17 seers at Kozhikode (Calicut). 1 <i>thulam</i> =17.5 seers at Tirur.
Mysore	Small dried or salted varieties.	Rupees maund. per	Rupeess <i>viss</i> . per	1 <i>Viss</i> =120 tolas.
Orissa— Khujang, Puri, Sonapur and Chatarpur.	Cat-fishes, Jew fishes, sharks, prawns, hilsa, etc.	Rupees maund. per	Rupees seer. per	

The above table is self-explanatory. The unit in any one locality for a particular variety is seen to depend upon the volume of catch; when fish is plentiful, the largest unit is employed, e.g. *Kalli* for mackerel in Malabar. The catches are disposed of on the beach immediately the boats land and in view of the rapidity with which the quality of the fish deteriorates under our climatic conditions and the large quantities that have to be speedily handled, it is not always practicable to weigh the catch before sale. In the large fishing ports of England such as Grimsby, Aberdeen, etc., the catch brought in by a trawler or a drifter is sorted according to species and then to sizes, "boxed" in standard containers and then only auctioned. In the fish curing yards in this country fish is admitted only on the basis of weights. The possibility of using "standard" baskets in the producing areas and inducing fishermen to quote on the basis of standard weights may be explored by the State Fisheries Departments.

In the case of cured fish malpractices such as using non-standard weights and selling fish which is not fully dry are noticed in certain areas. This, however, is confined to wholesale transactions in assembling

and terminal markets. In retail sale cured fish is sold in small heaps or on the basis of weight.

C—Wholesale prices of important varieties at the chief producing centres

The average seasonal wholesale prices of the chief groups of sea and fresh water fishes in some producing centres are given in Appendices XIV and XV. The prices of the different groups vary from area to area. In the important producing centres the whole sale prices are low. For instance, in South Kanara and Kerala the prices of sea-fish are generally lower than in Orissa and East Godavari district. This tendency is not, however, so much marked in the case of fresh water fishes. For example, Bihar where the production of fresh water fishes is the highest in our country, the prices also rule fairly high owing to the proximity of consuming markets in and outside the State. The popular varieties everywhere fetch higher prices than the coarser bony fishes.

The prices of cured fish depend chiefly upon the type of cure. Cured fish is mostly consumed by the poorer classes in the interior as also in the hilly areas and many areas seem to demand products cured or sun-dried in a special way. The cost of production depends upon the system of cure, *i.e.* on the use or absence of salt, whether wet or dry-salted and the degree of driage. The keeping quality of the processed fish has also a bearing on the prices. If a variety when simply sun-dried keeps better for a longer period than when cured with salt, the sun-dried fish fetches a premium, *e.g.*, horse mackerels, dried fish is food in a more concentrated form and its price appreciates proportionately with the amount of driage. Prices of dried fish in a few markets for which data are available may be seen in Appendix XVI.

D—Factors affecting fish prices

The following four factors mainly influence or determine the prices of fish and its products :—

- (i) The type of fish, its size, weight and quality.
- (ii) The purpose for which it is sold, *i.e.*, for consumption as fresh fish or for curing or manufacturing purposes.
- (iii) The distance of the producing centre from place of consumption, and
- (iv) The elasticity of demand.

Of the above, factor (ii) relates mostly to sea-fish.

(1) TYPE OF FISH, ITS SIZE, WEIGHT AND QUALITY

Besides market conditions differences in type, size, weight and quality considerably influence the prices of fishes. Marine varieties like Pomfrets, Seer and Indian Salmon, estuarine varieties like Hilsa and Beekti and fresh-water variety like Rohu are prized for their taste. In

The following table No. 26 the difference in prices between these varieties and cat-fishes, a group of fishes generally regarded as coarse, have been compared.

TABLE NO. 26

Types of fishes and their price difference

(Data relate to 1956-57)

(Per maund)

Name of the Centre	Prized Variety		Average annual price of cat-fish	Ratio of Column (3) to (4)
	Name	Average Annual Price		
1	2	3	4	5
		Rs. nP.	Rs. nP.	
Calcutta	Rohu	95·00	67·54	1·42 : 1
	Hilsa	70·50	67·54	1·04 : 1
	Beckti	80·52	67·54	1·19 : 1
Bombay	Pomfret	97·78	20·27	4·82 : 1
South Kanara & Malabar Districts.	Pomfret	25·00	12·00	2·08 : 1
Tirunelveli District	Beckti	30·00	15·00	2·00 : 1

The difference in price margin, as will be seen from the above table, varies a great deal from place to place. For example, in Calcutta which is the largest consuming centre in our country and where there is a great demand for all types of fish, the margin between cat-fish on one side and favoured fish viz., Rohu, Hilsa and Beckti on the other is comparatively less. On the other hand in places like South Kanara, Malabar and Tirunelveli Districts the marginal difference is practically double. In Bombay, however, where pomfret is prized the most, the marginal difference between cat-fish and pomfret is even more than four times.

These prized varieties fetch approximately the same premium in the cured state also.

Size is not as important a factor in determining the prices of sea fish as it is in the case of the fresh water varieties. Most of the economic varieties of the former arrive in large shoals comprising fish of almost the same size and weight. In case of fresh water fish, however, large

and small specimens of the same species are often caught in the same net particularly in the case of carps, cat-fishes, etc., which grow to enormous sizes. Up to a certain size, regarded as optimum for the species (beyond which there is little demand) prices per maund vary in proportion to the size of the fish.

Among fresh-water fishes the favoured varieties are carps (Rohu) and live-fishes (Magur), which are prized the most. Carps and cat-fishes are universally present in the inland waters of our country and the former fetch prices which are higher from 10 per cent to about 79 per cent as will be seen from the following table.

TABLE NO. 27

Retail prices of carps and cat-fish in certain markets

(Data relate to 1956)

(Price per seer)

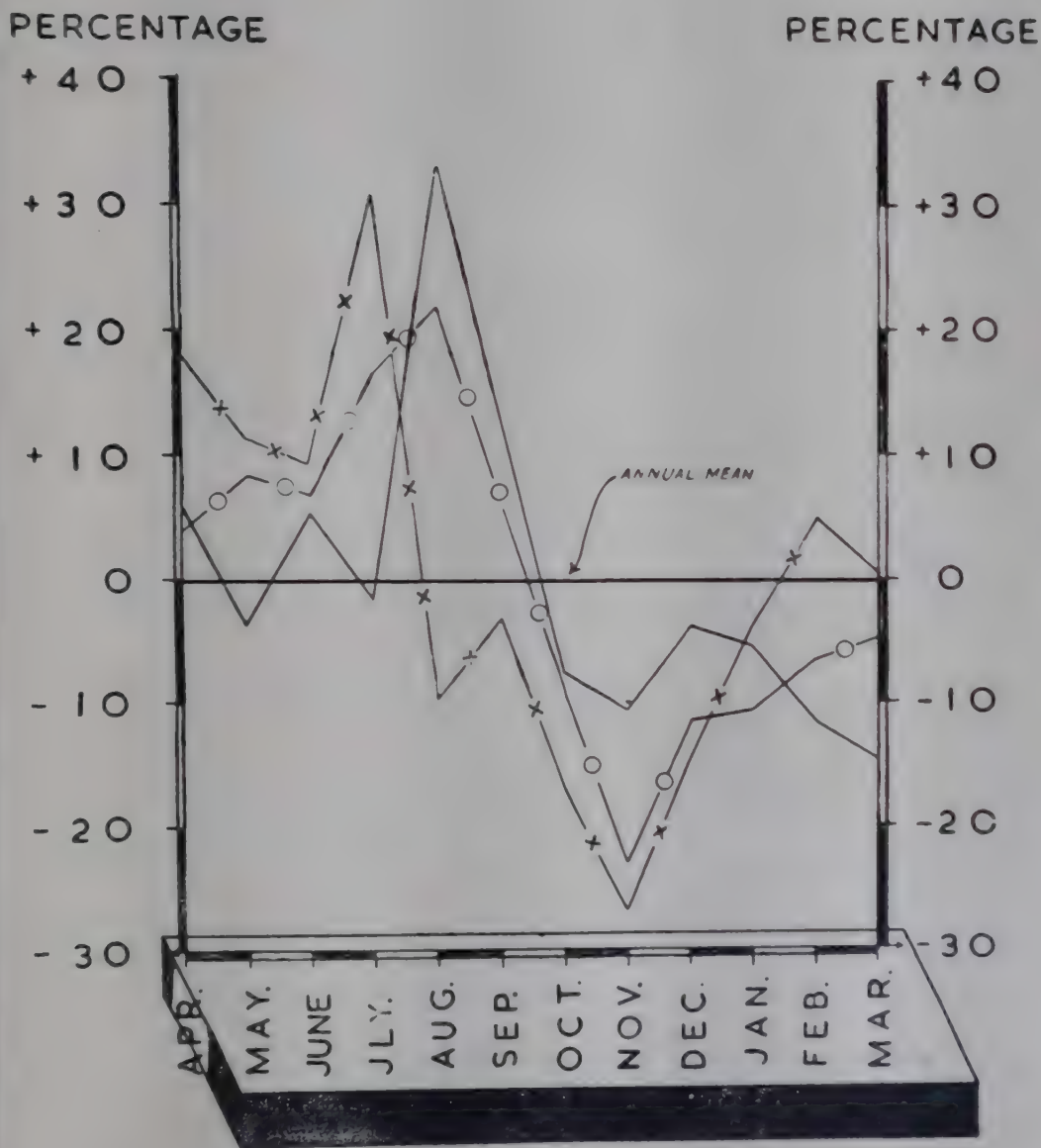
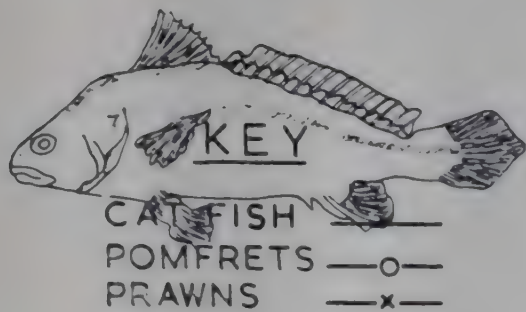
Name of the Centre	Carps	Cat-fish	Ratio of column 2 & 3
1	2	3	4
	Rs. nP.	Rs. nP.	
1. Delhi	2.39	2.17	1.10 to
2. Lucknow	1.83	1.09	1.68 to
3. Agra	1.02	0.57	1.79 to
4. Raipur	1.75	1.37	1.28 to

“Live” fishes that can be kept alive up to the time they are dressed are esteemed not merely for their so called nourishing qualities but also for their comparative freshness.

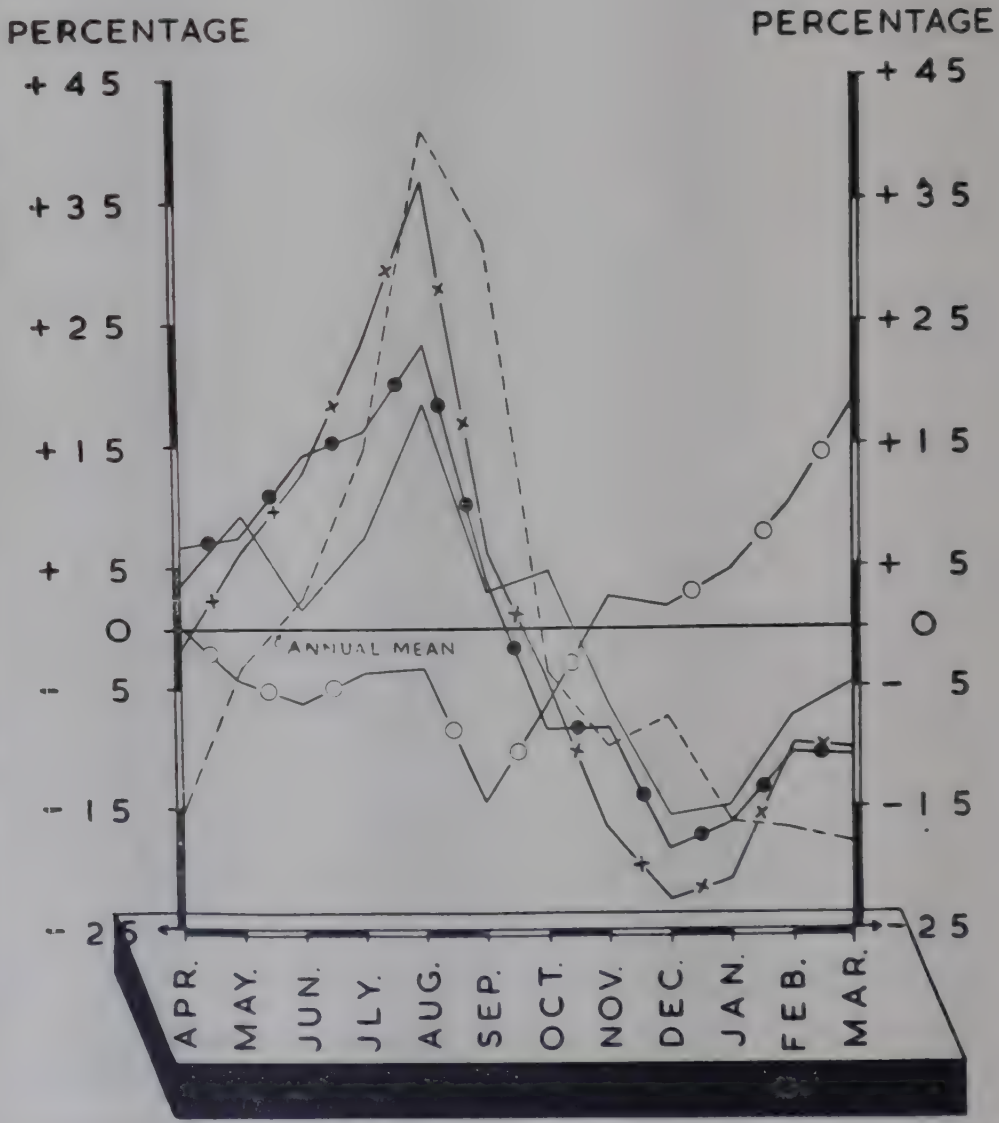
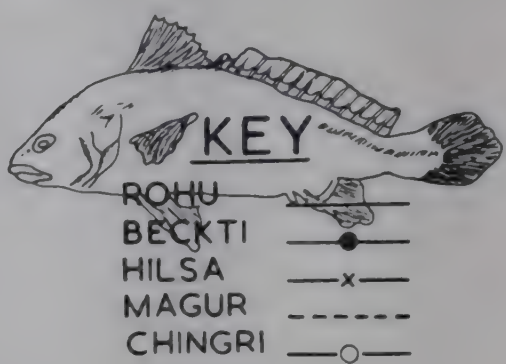
(2) FISH SOLD TO MANUFACTURERS OF FISH-PRODUCTS

The curing and drying as well as the manufacture of fish manure, fish guano, are carried on in rural areas on the sea coast from where it is difficult to transport fresh fish to urban centres of consumption. These operations are undertaken on a large scale when there is a good catch awaiting disposal. Competition between fresh fish merchants and manufacturers is rare except during years, when due to the general failure of the fishing season, the economic varieties are not caught in normal quantities. Under such circumstances prices also run higher.

PERCENTAGE DEVIATION OF THE AVERAGE MONTHLY WHOLESALE PRICES OF FISH FROM THEIR ANNUAL MEAN. (BOMBAY-5 YEARS' AVERAGE)



PERCENTAGE DEVIATION OF THE AVERAGE
MONTHLY WHOLESALE PRICES OF FISH FROM
THEIR ANNUAL MEAN.
(CALCUTTA-5 YEARS' AVERAGE)



When the quantity available is small the catch is generally sold to merchants dealing with fresh and iced fish and to the curers when it is large, because the latter can buy larger quantities than fresh fish merchants whose demand is quickly saturated. The prices paid by the curers are invariably lower than those paid by fresh fish merchants, as shown in the following table giving the comparative prices realised by fishermen selling their catches to these two groups of purchasers in Karala centres in the west coast of the State and one Centre in Madras State.

TABLE NO. 28

Comparative prices per maund of fish in certain centres sold for curing for preparation of fertilizers and for consumption as fresh fish

(Data relate to 1957)

(Rs. per maund)

Name of centre	Variety of fish	Price realised when sold to		Percentage of column 3 to column 4
		Fresh fish merchant	Fish curer	
1	2	3	4	5
		Rs. nP.	Rs. nP.	
Malapalayam . . .	Mackerel . . .	16·25	15·50	104·8
Malapalayam . . .	Pomfrets . . .	31·00	30·00	103·3
Beypore	Oil-Sardine . . .	15·00	13·00	115·4
Tanur	Jew-fish	10·00	9·25	108·1
Tanur	*Sardine	10·00	6·00	166·7

*For manufacture of Fish-manure.

It is further observed that the fishermen receive better prices from manufacturers when fish is bought for curing than for the production of fertilizers.

(3) DISTANCE BETWEEN PRODUCING AND CONSUMING CENTRES

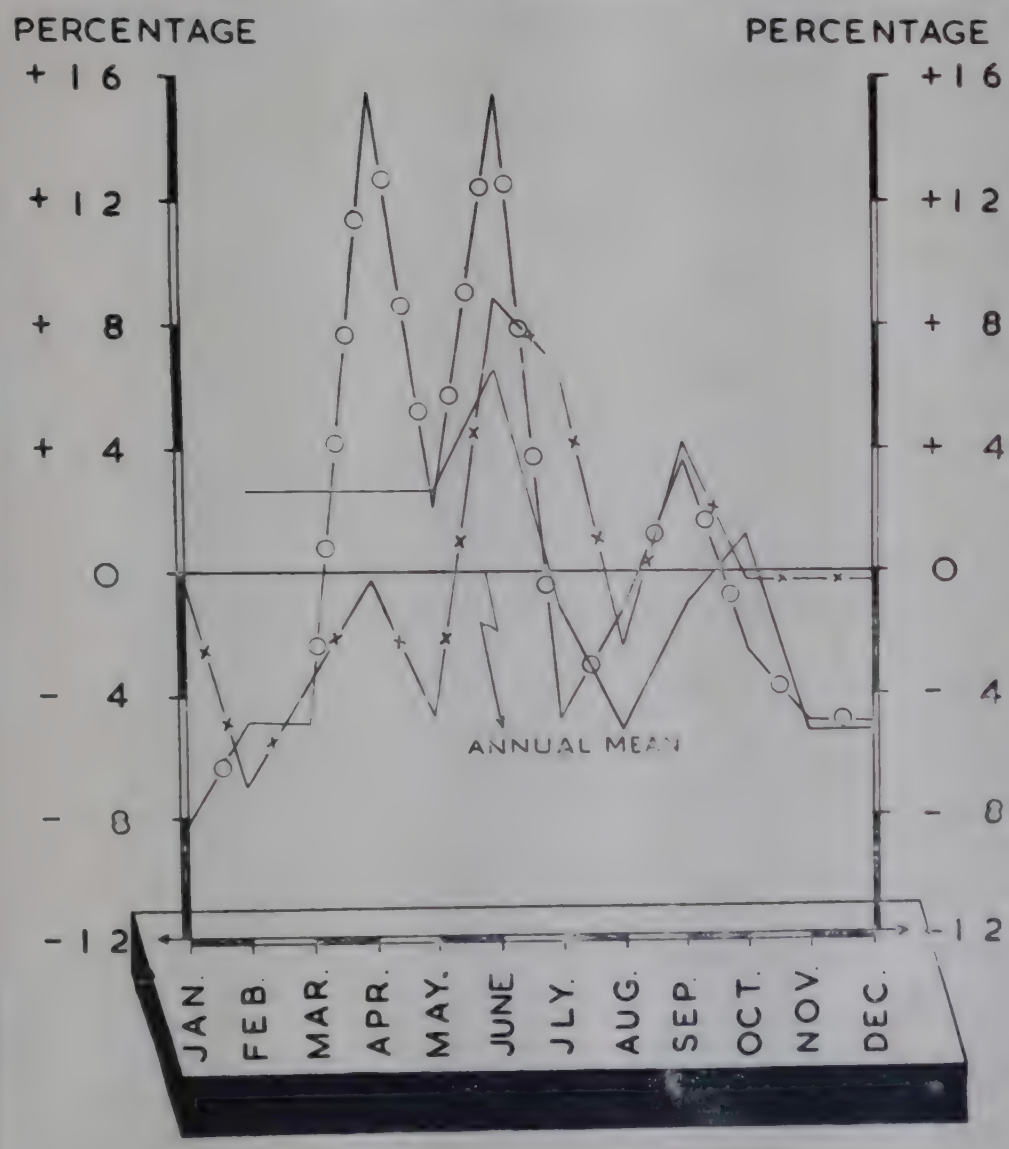
As stated earlier the demand for fresh fish is mostly concentrated in towns and cities. The sources of supply of fish for consumption in urban areas are the local and partly the neighbouring fishing centres. When the facilities for importing fish are good and the quantity received

for sale is large, the prices drop down in the urban consuming areas. In the following table the prices of fish in certain urban markets and in the fishing areas which supply them, are given :—

TABLE NO. 29
Fresh-fish prices in producing and consuming centres
(Data relates to 1956-57)
(Price Rs. per maund)

Name of Fish	Producing centre	Whole-sale Price in producing centre	Consuming centre	Whole-sale Price in consuming centre	Percentage difference
1	2	3	4	5	6
<i>West Bengal :</i>					
Carps . . .	Berhampur . . .	47·50	Greater Calcutta	93·02	95·8
Hilsa . . .	Lalgola . . .	50·00	Do.	70·50	41·0
Beekti . . .	Canning (Sunderban).	71·70	Do.	90·42	26·1
Bhangan . . .	Kakdwip (Sunderban).	55·00	Do.	80·71	46·7
Prawns . . .	Gosaba (Sunderban).	60·00	Do.	96·29	60·5
<i>Assam State :</i>					
Carps . . .	Samaguri Beel . . .	60·00	Nowgoan . . .	65·50	9·2
Cat-fish . . .	Nowgoan . . .	60·00	Gauhati . . .	80·00	33·3
Chital . . .	Gauhati . . .	80·00	Shillong . . .	110·00	37·5
<i>Madras State :</i>					
Carps . . .	Metturdam . . .	13·94	Madras . . .	27·57	97·8
Cat-fish . . .	Metturdam . . .	13·94	Madras . . .	27·57	97·8
<i>Kerala State :</i>					
Oil-Sardine . . .	Beypore . . .	15·00	Calicut . . .	16·00	6·7
Jew-fish . . .	Tanur . . .	10·00	Do. . .	11·00	10·0

PERCENTAGE DEVIATION OF THE AVERAGE MONTHLY WHOLESALE PRICES OF FISH FROM THEIR ANNUAL MEAN.
(MADRAS-2 YEARS' AVERAGE)



PERCENTAGE DEVIATION OF THE AVERAGE
MONTHLY WHOLESALE PRICES OF FISH FROM
THEIR ANNUAL MEAN.
(PATNA-3 YEARS' AVERAGE)

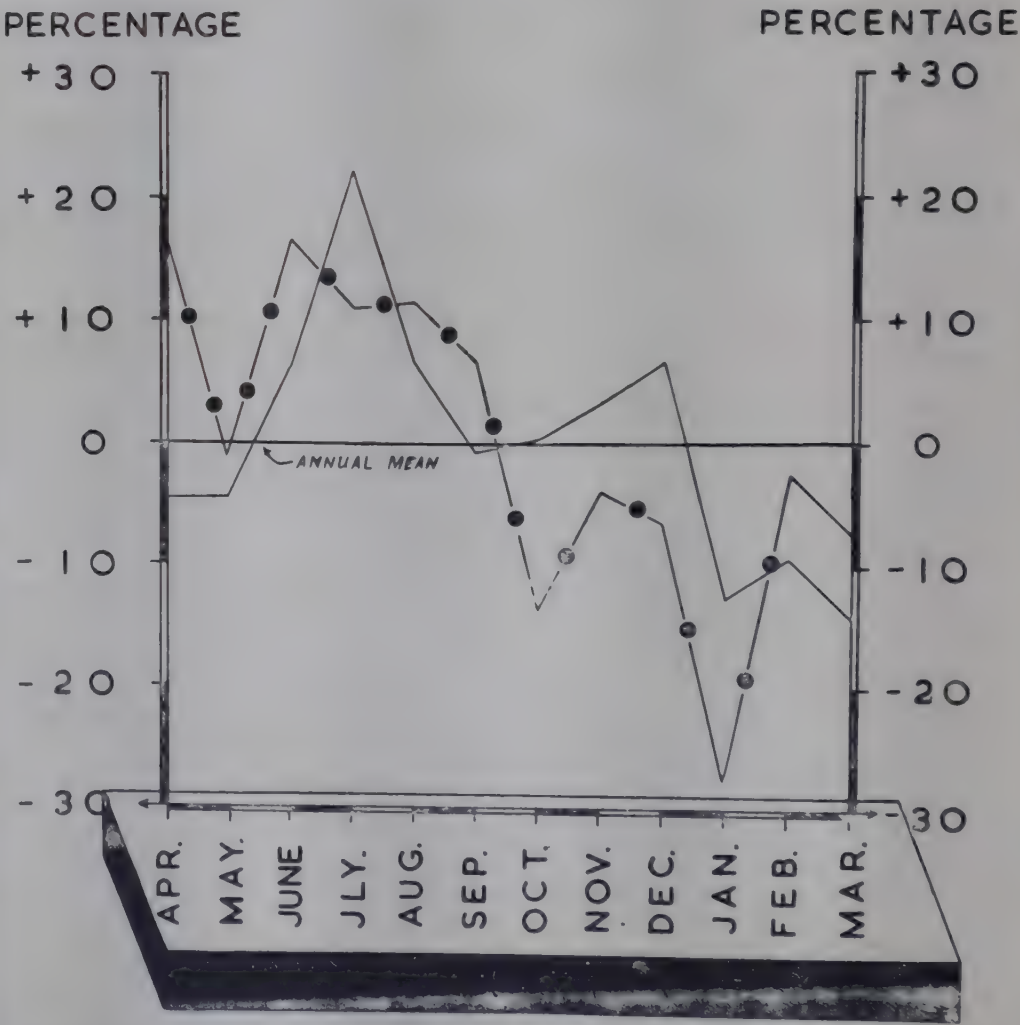
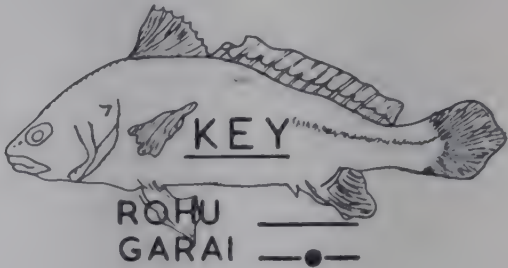


TABLE NO. 29—*contd.*

1	2	3	4	5	6
<i>Orissa State :</i>					
Pomfret .	Gopalpur . .	30·00	Cuttack .	52·50	75·0
Beekti . .	Chilka . .	55·00	Do.	67·50	22·7
Hilsa . .	Gopalpur . .	42·52	Do.	75·00	76·4
Prawns .	Puri . .	40·00	Cuttack .	65·00	62·5
<i>Madhya Pra-</i> <i>desch :</i>					
Carps . .	Raipur . .	40·00	Raipur .	55·00	37·5
Cat-fish .	Raipur . .	30·00	Raipur .	40·00	33·3
<i>Bombay State :</i>					
Pomfret .	Veraval . .	37·00	Bombay City.	50·00	35·1
Wam . .	Bombay . .	25·00	Kolhapur City.	50·00	100·00
Seer . .	Ratnagiri . .	20·00	Do.	70·00	250·00

Prices of cured fish also vary according to the distance between the curing centre and the consuming market. The following table shows that the cost increases with the distance.

TABLE NO. 30

Prices of cured fish according to distance

(Data relate to 1956)

(Rs. per maund)

Market	Name of the		Dist- ance in miles	Price		Percen- tage differ- ence
	Fish	Curing centre		at cur- ing centre	in Mar- ket	
Orthanad (Tan- jore).	Salted Cat-fish	Tanur	260	15·00	29·75	98·3
Malapalaya m (Tirunelveli)	Do.	Do.	325	15·00	35·25	135·0

(4) ELASTICITY OF DEMAND

The price of fish also depends upon the time when they are landed and marketed and on whether the day of sale is a "day of fasting" for the local consumers or "day of rest" for the local fishermen. Good prices are obtained if the catches arrive early in the morning. At places which despatch fish packed with ice, fishermen try to return to suit the timings of the fish carrying trains. When boats bringing in the catch arrive late in the afternoon, it becomes difficult to dry the fish in the sun or to apply salt and the prices offered, therefore, are low.

Moplah fishermen of Malabar abstain from catching fish on Fridays. The fishermen of Travancore and Tuticorin are mostly Christians and they observe Sunday as a day of rest. On days when all fishermen do not go out for fishing supplies are limited and high prices prevail. On festivals when there is a greater demand than on ordinary days the prices run high but on Hindu fast days, *e.g.*, *Amavasai* (New moon) *Kirthigai*, *Ekadasi* etc., in south India, fish is cheap.

E—Seasonal variations in prices

The combined influence of the seasonal variations in supply and demand results in periodic fluctuations in prices. The monthly prices of certain economic groups of fishes in the markets of Bombay, Calcutta, Madras and Patna for recent years are given in Appendices XVII to XIX.

As is the case with all commodities whose production is seasonal, prices of fish are generally higher at the beginning than when the season is well advanced, but different varieties of fishes have different cycles of price variations in different markets. These changes, expressed as the percentage deviations of the average monthly prices from their annual mean, for certain economic groups of fishes in the markets of Bombay, Calcutta, Madras and Patna are shown in the graphs facing pages 86 to 89.

In the case of Bombay market, it will be observed, that the prices of cat-fishes showed a decline from the month of October onwards and the lowest point was reached in March when the price ruled 14·4 per cent below the average annual mean. Similar tendency was noticed in case of pomfrets also, but the lowest point (minus 23·0 per cent) was reached in the month of November. These are the months of high supplies due to favourable fishing conditions. In summer months, the supply decreases gradually and the prices start rising from April onwards, the highest point in case of pomfrets and cat-fish was, therefore, reached in the month of August when the prices were 26·9 per cent, and 33·0 per cent above the average annual mean. In the case of prawns, however, the decline in prices started from the month of August onwards and the lowest point reached in November when the price ruled 26·9 per cent below the average annual mean. From February onwards a gradual increase in the prices of prawns was observed and the highest point reached in July when the prices were 30·9 per cent above the average annual mean.

In Calcutta market, the prices of all quality fishes like Rohu, Beekti, Hilsa and Magur, have similar seasonal price variations. For example, in case of Rohu and Beekti the decline in the price had been in the months of October-November onwards and lowest point was reached in December when the price rules 15·5 and 18·2 per cent respectively below the average annual mean. The prices had risen from April onwards and in August the price had reached its peak being 18·6 and 23·3 per cent respectively above the average annual mean.

In case of Hilsa and Magur the lower tendency of prices was noticed from the month of October onwards. The lowest point (– 22·3 per cent) for Hilsa was reached in December while for Magur the lowest point (– 17·8 per cent) was in March. In December when the supply of both inland and marine fishes is the highest, Spent Hilsa is also caught in large quantities, the prices of this variety are, therefore, the lowest in this season. Magur a 'live-fish' is caught in large quantities in summer months, February to April when water level of the inland reservoirs recedes and, therefore, the prices of the variety are low during this period. The prices of Hilsa and Magur showed an upward trend from May and June onwards respectively. The highest point was reached in both cases in the month of August when the prices ruled 36·8 per cent and 40·6 per cent respectively over the average annual mean.

The price fluctuation of *Chingri* (Prawns) in Calcutta was remarkable because the fall in price started from May onwards and reached the lowest point (– 14·2 per cent) in the month of September when the prices of other varieties of fish showed higher tendencies. This is because in rainy season *i.e.*, from June to September, the supply of *Chingri* is the maximum.

In Madras market the price of Carps and Hilsa showed a decline from July onwards and the lowest point (– 5·2 per cent) was reached in November for carps and in January (– 8·2 per cent) for Hilsa. The heavy catch of Hilsa during the rains in winter months at Madras is responsible for Hilsa prices showing a fall during November to March. The high price tendency was observed from February onwards for Carps and from April onwards for Hilsa and in both cases the prices ruled highest in June. In Carps it was 6·6 per cent and for Hilsa 15·5 per cent over the average annual mean. As regards pomfrets the prices were below the average annual mean during major part of the year and was the lowest (– 7·0 per cent) in the month of February. The prices ruled high only in the months of June and July, reaching the peak (8·8 per cent) in July. The supply of pomfrets is equitably distributed in Madras market as this is a favourite variety.

In Patna market, the price of Rohu (Carps) and Garai (Cat-fish) was observed to show a high tendency from June onwards and the highest point was reached in the month of July for Rohu and in June

for Garai when the ruling price was 22·1 per cent and 16·6 per cent, respectively, over the average annual mean. The price declined thereafter and the lowest point was observed for Rohu to be in the month of March and for Garai in the month of January, when the price ruled was 14·2 per cent and 27·7 per cent respectively below the average annual mean.

From the above examples, it can be concluded that the seasonal price variation differs for each variety of fish and even for the same type it varies in different States. However, broadly speaking the prices generally decline during peak period of the catches *i.e.*, in winter and rise high in rainy season when both the inland and marine sources are not easily accessible for fishing owing to high torrential rains and floods.

F—Note on retail prices

No systematic records regarding retail prices exist. Some local bodies *e.g.*, municipalities and cantonment boards do maintain some sort of a record, but these are defective and cannot be relied upon. The month end retail prices of certain varieties of fresh fish during the three years period ending 1956-57 at Calcutta and Madras are given in Appendices XX-A and XX-B. The enormous variations in the prices of fish of the same types in the two cities are remarkable.

As the retail trade is not subject to any systematic control, the retailers usually charge what they can. The most important single factor, however, is the purchase price of the retailer, who adjusts his price not only according to supply and demand but also according to quality of the produce and the purchasing capacity of the consumers.

In the absence of fixed prices and quality, bargaining and higgling is a common feature of the retail trade in fish. For developing the trade and for equitable distribution of fish and for planning marketing improvement work the need for a machinery for collecting and disseminating wholesale and retail prices as they rule from day to day in the key markets is obvious and paramount.

G—Trend of fish prices

(1) FRESH FISH

In the absence of regular records showing the prices in various markets over a series of years it is very difficult to examine the trend of fish prices for the country as a whole. The average annual wholesale prices given below give some idea of the trend in the States of West Bengal, Bombay, Kerala and Madras.

West Bengal.—The average annual prices of commercially important varieties of fresh fish in Calcutta for the years 1948-49 to 1956-57 are given in the following table below:—

TABLE NO. 31

Average annual prices of important varieties of fresh fish at Calcutta
(Rupees per maund)

	1948-49	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57*
Katla	92.64	97.80	93.40	93.36	74.12	65.89	66.10	86.39	90.55
Rohu	97.64	104.06	101.87	100.49	85.55	73.50	69.79	92.00	96.64
Hilsa	93.61	92.62	95.65	99.36	87.78	71.14	70.75	58.76	63.47
Chingri (Bagda)	85.39	94.39	94.15	106.17	88.99	78.90	91.48	87.05	74.72
Lobster	84.87	107.37	100.87	118.33	95.52	80.00	..	..	77.55
Beekti	85.03	95.47	107.56	108.48	105.61	87.00	94.98	88.12	85.27
Indian Salmon	65.42	80.02	76.70	64.42	79.08	63.97	61.24	58.16	55.86
Mullet (Bhangan)	86.52	97.80	90.25	89.96	97.24	83.30	76.46	61.75	58.55
Pangash (Butter fish)	59.34	86.62	74.77	76.11	72.37	65.28	62.17	68.08	63.16
Kai	116.69	105.52	94.50	96.53	92.00	67.94	81.89	88.44	92.59
Magur	131.62	121.80	121.97	123.19	119.12	86.55	99.18	111.19	108.61
Average	90.80	98.54	95.61	97.85	90.67	74.86	76.41	80.00	78.82
Index (Taking 1948-49 as 100).	100.0	108.5	105.3	107.8	99.9	82.4	84.2	88.1	86.8

*Average for 11 months *i.e.*, (May 1956—March 57).

It will be observed from the above table that the trend has been erratic during the above period. In the immediate post-partitioned period and upto 1952-53 the prices ruled high in Calcutta than in the subsequent period.

Madras and Kerala.—The table No. 32 gives the annual average prices of five economic varieties of fish on the Kerala West Coast and Madras East Coast for the quinquennium ending 1956-57.

TABLE NO. 32

Average annual prices of certain 'varieties' of fish on the West and East Coast

Particulars		Cat-fish	Jew fish	Pomfret	Macke-rel	Prawns
<i>West Coast :</i>						
1951-52	Price per md. Rs. nP.	18·13	15·33	30·01	22·25	10·16
	Index Number	100	100	100	100	100
1952-53	..	105	120	115	105	110
1953-54	..	110	125	125	110	120
1954-55	..	120	140	125	120	130
1955-56	..	130	150	130	125	140
1956-57	..	132	153	135	125	150
<i>East Coast :</i>						
1951-52	Price per maund Rs. nP.	28·69	20·00	40·08	27·44	25·21
	Index Number	100	100	100	100	100
1952-53	..	104	111	103	110	110
1953-54	..	109	117	114	103	127
1954-55	..	112	125	121	113	139
1955-56	..	120	140	125	117	150
1956-57	..	125	142	128	120	152

Source : Government of Madras.

The above table shows that the trend of prices has been upward in these areas during the period under discussion.

Bombay.—The average annual prices of cat-fish, hilsa, prawns, pomfret and bekti shown in Appendix XVII do not indicate any abnormal tendencies, the trend has remained more or less stationary.

(2) IMPORT AND EXPORT PRICES

It has been possible to calculate import and export prices only from the "declared values" of preserved fish imported into and exported from India. The annual declared values of the chief varieties traded

n, as classified in the Custom's returns together with the trends have already been discussed in Chapter III.

H—Note on prices of fish and fish by-products

The qualities of fish products produced in various tracts differ considerably and their prices show a great variation *e.g.*, Shark Liver-Oil which is manufactured in our country, is highly priced because of its medicinal value. There are various brands of Shark Liver-Oil manufactured in India, having different potencies of Vitamin A and D and the higher the potency the more is the price, as will be seen from Appendix XXI which gives comparative price of various brands of Shark Liver-Oil and its products produced in the States of Bombay, Kerala, West Bengal and Orissa.

Similar variations both in qualities and prices have been observed from place to place in respect of fish-guano, fish-meal, fish-manure, fish dry salted, wet-salted, shark fins and fish-maws. The price quotations of fish-guano and fish-meal depend on the contents of Nitrogen and Phosphoric acid present in them. From the declared import and export prices, it is observed that the prices of fish manure are lowest as not much processing is involved in its manufacture. On the other hand fish-guano and fish-meal in which comparatively more processing is involved than fish-manure are sold at a higher price.

Out of the other fish by-products which are marketed for human consumption, the fish wet-salted is the cheapest, and fish-maws and shark-fins are highest priced. Bombay is the chief exporting port for shark-fins and fish-maws. Maws and fins are classified by merchants for price quotation. Large maws from jew-fishes and Indian Salmon go under the trade description 'Pota' and the small under 'Poti'. Similarly maws from cat-fishes are called 'Pok' and 'Bitki' Maws blackened by blood are called 'Badla'. The shark-fins are classified into two grades, the white and the black and these are further divided into three sub-classes according to size *viz.*, large, medium and small. The white variety is better priced than the black one. At Madras during 1957 the rate of Black fins ranged from Rs. 70.00 to Rs. 74.00 per maund while in case of white-fins it ranged from Rs. 90.00 to Rs. 98.00 per maund.

I—Market intelligence

The dis-organised marketing, the localised character of the demand and the lack of recognised standards of qualities are largely responsible for the absence of a market intelligence service for fish. In towns and cities where the trade is somewhat organised, the merchants and commission agents keep themselves in touch with the prices prevailing in producing areas. The fisherman unless he has himself been to the market, gets the news from his neighbours who have recently visited the local assembling centre. Under these circumstances, it is unlikely that the information reaching the fishermen can be accurate or up-to-date.

In the case of fish despatched for sale in urban markets from distant fishing centres, sale on commission basis is very common and the commission agents keep the consignors informed about the price ranges of the important varieties by communicating weekly or fortnightly quotations. From Ceylon, an important market for preserved fish produced in maritime districts of south India, weekly price lists on printed forms are received by the big exporters, from commission agents in Colombo. The market position in respect of arrivals or stocks is not, as a rule, revealed in any of these communications. Very often these quotations are misleading and result in loss to the consignors.

Information on fish prices at certain markets appear periodically in the local papers. The following are some of the important journals which publish such information.

- | | |
|---|---------|
| 1. Price Bulletin by West Bengal Govt. | Monthly |
| 2. Agricultural Situation by Directorate of Economics
and Statistics | Monthly |
| 3. Bulletin of Statistics by U. P. Govt. | Monthly |
| 4. Price Statement by Joint Director of Marketing,
Orissa | Weekly |
| 5. Bulletin of prices by Directorate of Economics & Sta-
tistics | Weekly |
| 6. The Fort St. George Gazette by Madras Government | Weekly |

The above bulletins serve a limited purpose of maintaining the price series records. There is, therefore, a great need for organising a Fish Market News Service. Arrangements should be made to collect information relating to daily prices, arrivals and movement in both the main producing and consuming centres and disseminate the same through radio, daily papers and official bulletins. Community radio sets have been installed in the rural areas and if the All India Radio broadcasting stations nearest to the fishing centres broadcast daily prices the fishermen can be kept informed about the price trends.

CHAPTER VII—ASSEMBLING, STORAGE, TRANSPORTATION AND DISTRIBUTION

A—General background

Fish is landed at very many centres in India. Fishermen visit only the nearby fishing grounds. Some at a few centres, may have fortune and strike a big catch rapidly. Others may not be so fortunate and may return only after a longer period of absence and at a time inconvenient for the marketing of the catch. In one case the fish caught may be of a size and variety very acceptable to the consumers, in another they may be poor. No effective means of regulating the catch or foretelling the varieties of fish that would be landed exist, particularly in regard to marine fisheries. [On account of the perishable nature of fish, the total landings have to be cleared daily and supplies wherever they have been landed brought direct to the nearest assembling centres and rapidly sold.] The owner's (Fisherman, middleman or retailer) main desire is to sell at once. The chief economic need of the industry, it would appear, is to secure a more uniform supply; since it cannot, from the nature of the case, lie in a regulation of the quantities landed it must be found in the process of marketing. Under the present conditions, an immediate market is imperative with the result that there are sometimes gluts and sometimes shortages.

But proper care of the fish, on which depends the condition in which it reaches the shore and assembly centres, is not possible on board the type of fishing crafts plying in Indian seas. There is no place in a catamaran, canoe or boat where the catches could be safely stored with ice. Further, as all crafts take a fairly long time in getting back to the shore considerable time must elapse between the time of capture and the landing of the fish. During this time, even in the larger boats fish are heaped pell-mell in the open holds where they remain exposed to the sun and the weather. The position of the ice supply for the fishing industry in India is very acute, but, even if sufficient quantities were available, its use to a great extent would be militated by the limited space available on board the vessels and the long time taken in journeys to and from the fishing grounds. Practically in no case are fish gutted and cleaned prior to storage and covered as they are with slime and blood the chances of their deterioration during the time that elapses between capture and landing are very great. As after arrival on shore also no precautions are taken for preventing further decomposition, the catches have either to be quickly disposed of in the nearest markets or preserved by drying or salting. This state of affairs greatly limits the range of distribution of most of the catches particularly in the extensive coastal areas. If supplies could be stored, even for a short period, without deterioration the conditions of the trade

would be revolutionised. Storage facilities for fresh fish are inadequate at present though some cold storages have been constructed in important cities.

The fishermen, *i.e.*, those who actually catch the fish play only an insignificant part in the disposal of the catches. Their task generally ends when boats have been brought to the shore. The members of the fishermen's family do the preliminary assembling but the final assembling and distribution of the catch are generally done by merchants or commission agents who step in at this stage. At some fishing centres where facilities for sending out fish are available certain varieties, *e.g.*, pomfrets, seer perches, large prawns, etc., are sorted and despatched to the nearest towns and cities where they are in demand, otherwise, preserved fish or fish manure is made out of the whole catch.

The average consumer in this country finds fish costly. The fisherman, however, gets only a small proportion of the price paid by the consumer. The fish trade in all countries is beset with similar problems due to perishable nature of the material. In this country, custom, religion and prejudices and ignorance on the part of the distributive trade and the buying public introduce further complications in the marketing which is scarcely, if at all organised.

B—Fishing population

(1) FISHING COMMUNITIES

The fishing castes of India present many features of great interest, which are survivals of manners and customs dating from very remote times. According to ancient Hindu legislation, fishermen belong to the *Sudra* or *Servile* caste. In many coastal areas there are still two distinct types of fishermen: (i) those who capture fish a few miles out in the sea and (ii) those who pursue their avocations from the shore or fish in backwaters and creeks. In the Malabar district, men who capture fish with hooks and lines cannot take part in fishing operations with nets and *vice versa*. In Chilka lake fishermen or Machyya Jeebe as they are known locally belonging to the *Kento*, *Niari*, *Kartia*, *Gokha*, *Kondara* and *Tiara* castes are all *Oriyas* and the *Nolia* fishermen living only on the sea coast are telegus. *Kento* and *Niari* are considered to belong to the higher strata and catch fish only with nets and are not supposed to use traps which are meant for the lower fishermen castes. *Kartias* operate bamboo screen traps, and nets. *Gokha* operate drag and cast nets and are considered to belong to inferior caste. *Kandara* operate traps mostly for prawns and crabs. *Nolias* use mostly drag nets. Again in this area, certain castes can only capture fish while certain others can only market fish. Although the old time conventions are now less strictly observed and fishermen have taken

to other occupations, these still exert a great influence on the organisation of the industry in most parts of the country.

The marine fishing population consists of Hindus, Muslims and Christians in different coastal areas one or the other of the communities predominate. Muslim tribes like *Daldis*, *Pudu*, *Islams*, *Moppillas*, etc., and Hindu fishermen belonging to *Bhois*, *Kolis*, *Mukuvas*, *Mogers*, etc., castes are found in equal proportions along most parts of the West Coast. Roman Catholic Christians predominate in Central Travancore, and in the Palk Strait Bay area. Along the Coromandal coast the number of Hindu fishermen exceeds those belonging to other communities. In the Madras State, fishermen have customs of a patriarchal nature which is, however, more strictly observed on the Coromandal than on the West Coast. Under this system immense hereditary powers are held by certain individuals. The fishing villages (called *Kuppams*) have hereditary or elective headmen and hereditary priests who are the final referees in all family and caste disputes.

Fishing*, in general, is a hereditary profession carried on from generation to generation with almost all the members of the family taking part in it to a varying degree. In certain inland areas fishermen also own and ply boats and no distinction can generally be made between fishermen and boatmen. The professional fishermen of India are very ignorant, superstitious and highly conservative. They belong to the lowest stratum of society, and fishing is generally regarded as one of the meanest of all trades and professions. From the point of view of literacy also the fishing population is very backward. In general, they are very economically backward and except for their poor huts and tenements and some goods and *chattels* have very little of worldly possessions. In most cases the boats and the more expensive nets do not belong to them and they very seldom own fisheries or fishing rights. No separate statistics of the indebtedness of the fishermen for different parts of the country are available, but enquiries conducted by the Fisheries Sub-Committee revealed that their indebtedness to middlemen and financiers in most parts of the country was on so large a scale that they were no better than *serfs* or slaves. A common feature is the tendency of fishermen to become indebted to money lenders who are also fish buyers and suppliers of equipment. This places the fishermen in a weak bargaining position, and reduces his share of the ultimate selling price of the fish which in turn limits his accumulation of capital with which he could improve his equipment and rate of catch. The above picture reported by the Fish Sub-Committee in 1945, more or less remains the same.

Having recognised the importance and immediate necessity of improving the living conditions of fishermen and organising them into

co-operative societies it was resolved at the All India Fisheries Conference held at Madras that :

1. "Assistance be given to fishermen on a liberal scale in the same manner as the handloom weavers and the 'National Co-operative Development Funds' and 'State Co-operative Funds' be utilised for the purpose."
2. "All the facilities recommended by the All India Rural Credit Survey Committee be extended to the co-operatives of fishermen."
3. "All programme connected with production, storage, transport, processing and marketing of fish and credit requirements to fishermen be financed by the Co-operative Banks and the Reserve Bank of India and the terms of such finance be not less favourable than in the case of Agriculture."
4. "Whenever possible preference be given to genuine fishermen co-operatives for marketing of fish."
5. "The State Governments should take all possible steps to educate the fishermen in co-operation."

This Resolution was reiterated by the Conference of State Ministers for fisheries in 1958.

In view of their meagre earnings, the fishermen cannot carry on their profession except by constant borrowings from the middlemen financiers. Leaving out of consideration the individual fishermen who fish singly with cast nets or other similar implements all relatively large-scale operations are extensively carried out by parties working on joint enterprise basis, the catches to be shared between the fishermen and the owners of boats and nets. The latter, however, by virtue of their hold as financiers and being the owners of fishing paraphernalia and the sole agency capable of marketing the highly perishable commodity in distant markets are invariably able to collect all catches at prices much below the prevailing market rates. As a result, the part of the fishermen in the fishing industry is generally restricted to catching fish and retail sale of fish on a small scale in their own villages and adjacent areas. In large cities like Bombay, the fishermen would even sell in the retail markets the fish purchased by them from middlemen and wholesalers.

(2) NUMBERS ENGAGED IN THE INDUSTRY

According to the Census of India, 1951, the general population engaged in fishing, in sea and inland waters including the operation of fish farms and fish hatcheries, gatherers of chanks and pearls and of sea-weeds, sea shells, sponges and other water products was as given in the following table.

TABLE NO. 33

Table showing employers, employees and independent workers in fishing industry

Zones	Total		Employers		Employees		Independent workers	
	Males	Females	Males	Fe-males	Males	Fe-males	Males	Fe-males
1. North (U.P.)	10,352	404	113	10	208	7	10,031	387
2. East (Bihar, Orissa, West Bengal, Assam.).	88,684	11,372	1,670	187	6,257	851	80,757	10,334
3. South (Madras, Mysore, Kerala).	187,675	16,995	7,445	456	32,572	1,662	1,47,658	14,877
4. West(BOMBAY)	48,732	6,516	3,008	484	5,634	320	40,090	5,712
5. Central (M. P. and Andhra).	45,815	2,632	325	6	2,154	79	43,336	2,547
6. North West (Rajasthan, Punjab, Himachal Pradesh and Delhi).	1,828	17	49	..	1,014	..	765	17
7. Andaman & Nicobar.	22	..	..	..	1	..	21	..
Total India	383,108	37,936	12,610	1,143	47,840	2,919	322,658	33,874

SOURCE : Census of India, 1951 Volume I.

According to these figures the population engaged in the fishing industry is 4,21,044—3,83,108 males and 37,936 females and forms 0·1 per cent of total population in India in 1951. These figures, however, do not take into account persons engaged in canning and preservation of fish for which no separate published figures are available. The number of non-fishermen who depend upon the fishing industry for a living is also not known. To this class belong the merchants, middlemen, commission agents, labourers (engaged for transporting, curing, drying and packing fish), boat builders and net-makers.

There are several factors which determine the earning power of the fishermen operating in the different fishing areas. Fishermen living around the important consuming urban centres of big cities like Bombay, Calcutta, Delhi etc. and supplying fishes to these areas, have comparatively better daily income than those living in the interior. It may be stated that the sea-fishermen are miserably poor in Bombay except in the vicinity of larger towns. They are in a relatively fair condition from South Kanara down the entire West Coast of India but once round the Cape Comorin they again appear as a poverty stricken race of people and this condition continues to be the same along the whole of the Coromandal coast.

In India, fishing is a hereditary profession among certain communities, so while developing the industry for the benefit of the consumer due regard should be paid to this fact. The interest of the fishermen by birth may be safeguarded for the development ultimately rests with him.

C—Methods and agencies of assembling

The marketable surplus of fish is disposed of by the members of the fishermen's family (i) either by themselves taking it to the nearest market or assembling centre, or (ii) by selling at the landing ghats to intermediaries who take it to the assembling centres. These intermediaries include agents of middlemen-boat-owners and curers, village merchants and itinerant dealers. Fish merchants functioning in the triple role as wholesalers, commission agents and curers play an important part in the assembling and distribution of fish specially in the coastal area of South India.

The quantities of fish brought to assembling markets by fishermen and other intermediaries vary from day to day in different markets depending upon the total supplies.

(1) FISHER-FOLK

The fishermen catch the fish and its disposal is left chiefly to other agencies. Along the coastal areas, the fisher-folk (members of the fishermen's family) collect the catch from the boats and do the preliminary assembling. If there is a consuming market in the neighbourhood the fisherfolk take the fish direct to consumers. Owing to the perishable nature of the commodity, transit from producer direct to the consumers is possible only when the market is within a distance of 10 miles from the producing centre. The services of middlemen are requisitioned for marketing the catch in all other cases. The producers *i.e.*, fishermen and their families usually play only a small part in the marketing of fish as their financial obligations leave them little choice for disposing of their catches except to the creditors. Short term loans are generally taken by fishermen, which are repayable, mostly in kind, during the fishing season, from village merchants and curers and fish is sold to them. These agreements are generally verbal understandings. When the fish is sold to or through them, generally no interest is charged but in cases where interest is recovered it is very low. The prices paid to debtor fishermen are somewhat lower than the current local prices. In the coastal areas of the Madras State the difference is sometimes as high as 25 per cent.

Riverine fishing is usually conducted by parties of fishermen who move in batches in search of fish. These parties assemble their catches at suitable centres, located on the river bank, where commission agents await them.

(2) MIDDLEMEN BOAT-OWNERS

These persons, by virtue of their position as financiers have a great hold on the producers. The boats and nets used in coastal fishing are mostly owned by non-fishermen. Only very few fishermen own the necessary boats and gear. Fishing operations are conducted by parties consisting of 3 to 10 or even twenty persons. The catch is usually shared among the fishermen and the owners of the boats and nets. Although each member of the fishing party is free to sell his share in any manner he pleases, the boat-owners manage to corner the whole catch. The boat-owner whose share of the catch is often considerable, always exceeding the share of any individual fisherman has to arrange for the disposal of his share of the fish and he comes forward to purchase the share of the fishermen also and thus handles the total quantity. The fishermen accept the price offered by the boat-owner, even if it is lower than the prevailing market rates as they have to depend on him for the continued use of the boat. Where fish curing yards exist most of the middlemen boat-owners are also "ticket holders".

There is another type of middleman-boat-owner found in the Bombay area. He keeps fast sailing boats—no fishing operations are conducted from them—which meet the fishing boats in the producing areas. These middlemen make an annual contract with the fishermen for the supply of fish at agreed rates. The fish so collected is ultimately sold to the fish merchants in Bombay docks.

The power-propelled boats which bring fish supplies to Bombay and Calcutta visit the surrounding fishing areas and buy fish from the fishermen on cash. Contract rates are not in vogue but ceiling prices for the different varieties are fixed for the guidance of agents by the boat-owner, who is an urban wholesale merchant.

In Bombay a private company has been floated recently for the catch and sale of marine fish, in the city.

(3) PETTY AND WHOLESALE MERCHANTS, CURERS AND MONEY LENDERS

In the coastal areas and in every freshwater fishing centre there are many petty dealers who work independently with their own capital. They go to the landing ghat, on the beach or on the river bank and buy the individual shares of one or more fishermen. Having secured fish they walk fast—they run almost to the nearest village or town market. Fish is also sold to consumers on the way. Of late bicycles are being used by these people, the basket containing fish being tied to large stout planks which serve as "carriers" on these bicycles. These petty merchants in the coastal areas carry on business with salted or dried fish also. If fresh fish is scarce on a particular day, they purchase dry or salted fish instead from curers which also is duly sold in the above manner.

The wholesale merchant in the producing area is usually also a commission agent and a fish curer. He buys both fresh and cured fish. He has a number of paid labourers under him. Some of them are sent to the fish landing ghats to collect expeditiously fish that are

suitable for sending as iced fish. He generally advances loans to fishermen in cash or in kind, *e.g.* provisions, boats, or fishing nets on the understanding that fish would be sold to him. The "choice varieties" are despatched, packed with ice, to urban markets while the remaining quantity is used for curing, sun-drying or for the manufacture of manure, fish-oil, etc., depending upon the available varieties and supplies.

Commission agents and wholesalers in urban consuming areas receive fresh fish (i) from producers in the neighbourhood, (ii) from their agents who have gone in boats to buy fish from fishermen (Bombay and Calcutta) and (iii) from wholesale merchants in producing areas. Any convenient site to which fish consignments can be easily transported is chosen by these persons for assembling the fish. For example, special siding in the Sealdah Station at Calcutta, an open place within the railway compound near the Basin Bridge Station at Madras and the Arthur Crawford Market at Bombay serve as assembling and auction centres. In Calcutta there are special assembling centres for particular groups of fishes, *e.g.*, Ulteadanga for "live" fishes and Hatibagan for prawns.

Cured or dried fish from producing areas are also assembled by commission agents on behalf of the curers in consuming centres. The consignments are first taken to godowns of these agents and are assembled in the next weekly market. The godowns are usually adjacent to or sometimes within the market enclosure. In Bombay where very large quantities of cured and dried fish are assembled, special huts have been constructed by the Bombay Corporation rented out to wholesale merchants and commission agents for storing fish. Similarly, in weekly markets in inland areas, especially in South India, the market authorities have constructed special huts for the storage of cured fish.

In a few areas in West Bengal money-lenders (*mahajans*) assemble dried fish. They advance money to leaders (*bahardars*) of fishing parties who go in October to the uninhabited islands in the sunderbans for catching and drying fish. These advances are given on the security of fishing implements and boats. The *bahardar* also signs a bond agreeing to repay the advance during the fishing months, in kind, generally at the rate of 10 to 15 maunds of dried fish for every Rs. 100. The fish as soon as caught and dried are taken over by the *mahajan's* agents at the place of fishing brought to a convenient assembling centre. The cost of transport is born by the *mahajans*.

(4) CO-OPERATIVE SOCIETIES

Although there are more than 900 Fishermen's Co-operative Societies actually functioning in India which finance their members and sometimes assist them in the sale of cured fish the number of these institutions which undertake the assembling and distribution of the members' catches is very few. It is being increasingly recognised that amelioration of the socio-economic condition of fishermen is essential for the increased production and the better utilization of fish. Ignorance

superstition and poverty of fishermen make them an easy prey to exploitation by middlemen who are very often the richer people of their own caste. The general poverty of the fishermen producers does not permit them to buy any better tackle and their ignorance keeps them from employing better fishing methods of teaming up for co-operative effort to improve or exploit the fisheries. The States are now devoting more and more attention for improving the economic condition of the fishermen on co-operative lines with a view to ensuring lasting benefits to the fishing industry.

The distribution of the co-operative societies in certain States as obtained during the course of this survey is given below :—

In Madras State there are 175 Fishermen Co-operative Societies with more than 17,700 members on the rolls and with a paid up share capital of Rs. 1·55 lakhs. In addition to this, four district federations of fishermen co-operatives have been organised at Nagarcoil, Tuticorin, Tanjore and Madras in the Madras State to market the fish catches of the member societies. The inland fisheries of most of the provincialised water are leased out to these societies at nominal rates.

In Kerala State there are 63 Fishermen's Co-operatives out of which all societies have been provided with loans up to Rs. 48,500. In Mysore State there are 80 societies. In Andhra Pradesh there are 221 societies with a membership of more than 42,300 members and with share capital amounting to about Rs. 1·89 lakhs. Loans to the tune of Rs. 37,940 have been made available to the societies by the Andhra Pradesh Government.

In Bombay State there are more than 80 Fishermen's Co-operatives. The Saurashtra Central Co-operative Fish and fishery products Marketing Association was established at Veraval, Bombay State in the year 1956. The main aims and objects of the organisation are (1) to regularise marketing and preservation of fish and to increase the *per capita* earnings of the fishermen (2) to explore new fish markets in the interior area (3) to distribute fishery requisites to fishermen at cheaper prices and to encourage mechanisation of fishing vessels. The authorised share capital of the association is Rs. 5 lakh out of which the State Government have subscribed for shares worth Rs. 4½ lakh.

To begin with, the association is taking up the marketing of dried prawns and Bombay ducks which constitute nearly 70 per cent of the total catches. During the year 1956-57 sales to the tune of 3,432 mds. of dried prawns valued at Rs. 1·1 lakh and 1,000 mds. of Bombay-duck valued at Rs. 63·5 thousand took place.

The association also acts as a financial agency to the Government for distributing loans and fishery requisites to the fishermen and Fishermen Cooperative Societies under the Grow More Food Programme. During the year 1956-57 nearly 2 lakhs of rupees were distributed to the fishermen for the purchase of boats, nets, nylon twine etc.

The members of the Board of Directors of the Association consist of Government officials as *ex-officio* members and fishermen community most of whom are presidents of the different primary co-operative societies. In course of time the Central Marketing Association expects to export their produce to foreign countries like Burma, Singapore, Ceylon etc. and also take up the marketing of fresh fish in Bombay State.

"The Bombay Rajya Machimar Sahakari Sanstha" has been registered as an apex institution of Fishermen Co-operatives in Bombay with a capital of Rs. 1 lakh. As many as 55 Primary Co-operative Societies of fishermen are affiliated to the Sanstha which undertakes marketing of both fresh and dry fish and also supplies fishing implements such as twine, nylon, fish tackle etc. to its members. It also makes advances to fishermen against the fish marketed through the Sanstha. During the year 1955-56 the Sanstha marketed fish worth Rs. 9.5 lakh.

In Orissa State there are 72 Fishermen Co-operative Societies. In the Chilka lake area 14 Co-operatives handle more than 25,000 maunds of fish annually which accounts to nearly 40 per cent of the total catches. The objectives of the co-operatives are mainly, the leasing of fisheries to the fishermen, sale of fish to members of the society and the public, regulation of supplies to the consuming centres, fair remuneration for the fishermen's work etc.

In Uttar Pradesh there are seven Fisheries Co-operative Societies. In Assam 97 societies have been organised with a total membership of more than 3,800. In Bihar State there are 85 Fishermen Co-operative Societies whose members are more than 5,500.

In West Bengal there were 248 Fishermen Co-operatives in the year 1955-56 out of which 64 were located in 24-Paraganas district. The biggest co-operative enterprise in the State is the "Bidyadhari Spill Matasyajibi Samabaya Samity" Ltd. Calcutta, which started functioning as far back as year 1933. About 3,000 people including men and women earn their livelihood through this society. The daily income of the members varies from Rs. 4 to Rs. 5 and the average income per family is about Rs. 350 per month.

The *samity* handles about 7,000 maunds of fish annually which is marketed directly to the consumers, without the intervention of any middlemen. The welfare activities of the society include free school free medicines and sinking of tube-wells. The profits of the society during the year 1948 were Rs. 76,318 which increased to Rs. 1,76,275 in the year 1955-56.

A scheme known as the 'Sunderban Co-operative Fishing Scheme' has started functioning from April 1957 in the Diamond harbour area of the Sunderbans. The main object is to distribute loans obtained from the Government to groups of fishermen instead of to individuals. Ten primary societies each with 35 fishermen members have been organised in the Sunderbans and these in turn are linked up with an apex body in Calcutta called the 'West Bengal Central Fishermen Co-operative Society Ltd.' The apex society provides the primary societies



FISH AUCTION AT THE CRAWFORD MARKET, BOMBAY.



A DRY FISH STALL IN A WEEKLY shandy.



A FRESH STALL IN A MUNICIPAL MARKET.

with fishing implements and makes arrangement for marketing the fish. The West Bengal Government have purchased Rs. 12,500 worth of shares and has made available an interest free loan of Rs. 1·75 lakhs repayable in 10 years to this apex society.

(5) COST OF ASSEMBLING

Most of the fishermen and petty dealers who handle small quantities of fish, do not incur any assembling charges, as they themselves take the fish on head loads, cycles or *bahangis* to the market. The wholesale merchants on the other hand, handle large quantities and the items of charges are (a) the cost of transport from landing centre to the merchants' premises, (b) the cost of the preparation of the fish for the market and (c) the incidental charges incurred on packing and despatching of fish—either fresh or preserved—to the consuming market. These charges vary from place to place. Wholesale merchants in producing area usually have labourers on monthly wages who do all the miscellaneous jobs and it is difficult to assess the cost of assembling separately. The incidental charges incurred in the marketing of fish are discussed in details under "Merchandising charges". (See page 119).

Due to lack of proper landing facilities, losses in assembling are fairly heavy. After the boats touch the shore considerable distances have often to be traversed with the catch exposed to the hot sun before the fish could be collected in any convenient place. This is either the vast area of sand or the soft wet mud on the banks of a river, over which movement is very slow. (See upper plates facing pages 15 and 109). Good landing facilities are not available even in cities like Calcutta or Madras.

In this respect the Government of India are exploring the possibilities of locating fishing harbours in suitable places. It was resolved at the All-India Fisheries Conference held in 1956 "that the Minor Ports Committee of the Ministry of Transport co-ordinate the efforts of fisheries exports on Harbour Science in development and maintenance of important fishing ports in the country". Most of the fishing centres are not connected by good roads to the neighbouring villages or despatching stations. More widespread use of ice will result in smaller losses while assembling.

The losses during transit depend also on the season of the year and the method of transport. In summer months losses are high. When fish is sent packed with ice to terminal markets, losses occur due to (a) insufficient quantity of ice and (b) crushing of the fish on account of fragile packages being piled one above the other. In the case of "live" fish which are brought in boats to the consuming centres and where often a month elapses between the catching and the sale, the fish lose weight on account of starvation.

Losses in the assembling of cured fish are negligible.

D—Fish markets

At some stage or other all fish (fresh or preserved) except the quantities retained by the producers for their own consumption, pass through markets—either daily or weekly markets—in rural areas or terminal markets in larger cities.

(1) RURAL MARKETS

In almost all villages which are situated near a fishing centre, there are open spaces which serve as fish markets. Some producers and village merchants assemble their produce there and consumers or retailers buy the fish. Prices are settled only after a good deal of haggling.

In the weekly hats or *shandies* a place is usually allotted for the sale of fish. Generally cured or dried fish is sold in periodical markets. In inland areas where the source of supply of fish is tanks fishermen catch more fish on *shandy* days and bring fresh fish also for sale in the markets. These markets serve an area within a radius of 10—15 miles. Purchasers are usually the retailers in the surrounding areas. In Madras State very large quantities of cured and dried fish are assembled and sold in weekly *shandies* (See upper plate facing page 107).

The rural markets are owned by District Boards or *Zamindars*. A market fee is generally charged from all people who assemble there for a sale of their goods. The right of collecting the market fee is generally given on contract on an annual basis, but the contractor can charge only according to a schedule of rates fixed by the owner. Fees are levied per seller or are based on the approximate quantity contained in a basket, hand-cart, or bullock cart. The rates vary from 3 nP to 25 naye paise per maund in the different markets.

(2) URBAN MARKETS

Urban markets (called *mandis* in certain areas) are wholesale daily markets usually situated in the district headquarters, important trade centres or near railway stations. Both assembling and distribution of fresh fish take place in these markets.

The markets vary considerably in size and lay-out. In Bombay a special section allotted in Crawford market serves as the secondary market, while in Delhi, Kanpur, etc. the transactions take place in *adatya's* shops. The fish section of the Crawford market is a large block, with expanded metal screens instead of solid walls, allowing plenty of light and air and with raised platforms which can be flushed with water after the day's business is over. (See upper plate facing page 106). A large number of commission agents operate in this market. Several auctions take place simultaneously, each commission agent selling fish consigned to him by wholesale merchants in the producing areas. At *adatya's* shops also the mode of sale is through, the buyers making open bids. Description of a typical auction scene in an *adatya's mandi* is given below.



WHOLESALE MARKET FOR ASSEMBLING AND
STORAGE OF DRIED FISH.



STORAGE OF DRIED FISH IN GOLAS.



TRANSPORT OF FRESH FISH IN FAST ROWING
BOATS IN THE INTERIOR OF BENGAL.



TRANSPORT OF FISH BY HEAD LOADS.

The auctioneer is the *adatya* into whose shop all the fish have to be assembled. The shop is ordinary and a common place, built in the form of an open shed. Sometimes it is only an open yard. A brick or cement flooring is provided and on one side there is a raised platform on which the *adatya*, his *munim* (1 accountant) and some dealers and buyers sit. A tub of water is provided in one corner for washing fish. As consignments arrive, the parcels are opened by the *adatya's* servants who sort the fish according to varieties and in some cases according to size also. The fish are then arranged in lots known as *chabbas* and these are made as nearly equal in weight, quality and value as possible. Buyers squat or stand around the fish assembled for offering their bids. The *adatya* starts the auction by himself offering a bid which he deems is reasonable and goes on increasing it according to the bids (which are generally indicated by certain signs, unintelligible to the laymen but well understood by the parties concerned) till he closes the auction at a certain price. Immediately a lot is removed, another *chabba* is put for auction. The final auction price of each *chabba* is noted by the *munim* in his books. After the day's business—generally the *mandi* opens at 8 A.M. and closes for the day by noon—the accountant prepares a statement for each dealer or assembler showing the amount accruing to the seller. The prices at which the different lots belonging to a seller were auctioned are shown. From this are deducted all the charges paid by the *adatya*, e.g. transport costs and incidental charges if any incurred and (a) his own commission which varies from 3 to 12 naye paise per rupee on the gross value of the fish sold and (b) equivalent value in cash of certain customary deductions in kind (*Koran*)* payable by the assemblers, to the *adatya* and his servants. In certain *mandis*, deductions are made in kind and the *adatya* auctions the “karan fish” at the close of the day's business. The *adatya* pays the seller cash immediately after the sale but usually allows the buyers credit for two or three days. If the seller has received any advance from the *adatya* the net sale proceeds due to him or a part thereof is adjusted towards the loan. It may be mentioned that the *adatya* usually gives interest-free loans to assemblers to induce them to bring fish to his shop. When the seller is not present in person, but has sent fish to the *adatya* on “commission basis” the net sale proceeds are remitted to him by post.

The auction system in Calcutta and Howrah wholesale markets is more or less, like that of Bombay except in certain minor variation. The offer of bid in Bombay pertains to one lot known as “chabba” while in Howrah and Calcutta markets, the offer of bid is per maund of fish. Generally the market functions at 4 A.M. and closes for the day at 3 P.M. or so.

In Greater Calcutta there are nine wholesale markets out of which the Howrah and Sealdah markets alone handle about 2,000

*The *adatya*, his *munim*, the servants who place lots for auction claim a large fish each while the sweeper and the *dhobi* who cleans gunny bags in which fish consignments arrive get slightly smaller specimens. Besides this, a large fish is also taken from the total quantity belonging to an assembler in lieu of the expenses the *adatya* incurs to feed him.

mds. of fish (2/3rd of supplies to Calcutta daily). The supplies are mainly from West Bengal, East Pakistan and from other States in India.

All the nine wholesale markets except Sealdah Fish shed are privately owned. Health authorities are, however, empowered to look after sanitation of the premises and also to inspect the quality of fish exposed for sale and have powers to destroy any unwholesome lot in the interests of public health.

The Sealdah Railway Station fish shed has been allotted to the Sealdah 'Fish Aratdahs' Association by the Railway authorities mainly for the arrivals of fish from East Pakistan. A portion of the platform has been demarcated with iron railings to form the wholesale market. A special parcel clerk is posted to attend to the fish consignments which begin to arrive from early in the morning. Most of the trains carrying fish arrive either in the mornings or evening to avoid spoilage due to heat. Fish wagons are provided with racks for convenience of handling.

(3) ORGANISATION AND CONTROL OF FISH MARKETS

The time of holding the fish market varies in different places. In rural areas, transactions take place when supplies expected from various sources have been assembled. In towns and cities fish markets are held early in the morning. In some, they are held both in the morning and the evening. In the latter case, the turnover is more during the morning session.

Except markets in cities, municipalities and cantonments, wholesale fish markets are not subject to the supervision or control of any public or Government organisation. The executive authorities of municipalities and cantonments are empowered, under the various legislative measures to control the sales of food and drinks to inspect the quality of fish exposed for sale within their limits and destroy any unwholesome fish.

These municipal markets are kept in sanitary conditions by the market authorities (See lower plate facing page 107). In other wholesale markets each *adarya* works independently; he, however, observes the established conventions regarding the rates of commission and other dues and provides certain amenities to his customers.

No direct transactions between sellers (when they are present) and buyers are allowed in *adarya's* shops. With a view to affecting improvements in the existing markets the Conferences of State Ministers for Fisheries held in 1957 and 1958 had recommended as follows:—

1. Separate markets or separate portions of general markets be set apart for the marketing of fish and that in the inland distributing centres suitable cold storage facilities be afforded for conserved distribution of fish.



TRANSPORT OF FISH BY SHOULDER SLINGS.



BICYCLES USED FOR CARRYING FRESH FISH FROM
THE BEACH TO MARKETS.



TRANSPORT OF FISH IN PONY CARTS.



TRANSPORT FISH PARCELS BY BULLOCK CART
TO THE RAILWAY STATION.

2. The local bodies be requested to take advice from the Central and State Departments in designing and improving the fish markets.
3. New fish markets should be established and existing ones improved.

E—Storage

Fish and fish-products are highly perishable; attempts are, therefore, made to dispose of stocks as quickly as possible even at a smaller margin of profit. In spite of this, some storage becomes inevitable during their movement from one agency to another before they reach consumers.

Fresh fish is not generally stored in any consuming centre for more than 2 days. Even for storage for this period the fish has to be packed with crushed ice or kept in a chilled room of a cold storage as in Bombay and Calcutta (see page 49 of this report). The quantity of frozen fish stored for long periods is negligible at present.

Storage is possible and necessary in the case of cured fish and fish-products. The period of storage differs in different areas and depends upon factors such as type of the products, nature and efficiency of its cure or preservation, the season and the trade demand. Oily varieties, wet-salted and light-cured fish are disposed off quickly. Hard dried fish can be and which are sometimes stored up to six months. Fish manure and guano are soon sold.

Fishermen do not store preserved fish. They are in need of cash and immediately the fish are sufficiently dry, they are sold to a wholesale merchant in the producing area. During preparation they keep the fish in gunnies, baskets or in heaps. Curers and wholesale merchants store preserved fish in heaps in a corner of their houses, or in special sheds erected for the purpose. In certain parts of West Bengal and Assam dried fish are stored in *golas*. (See lower plate facing page 108). On a raised brick platform about 2 feet high from the ground, a conical structure 6 to 8 feet in height is erected using split bamboos and double mats. When filled with fish the *gola* is covered carefully with more mats to exclude damp air. The pit system of storage is adopted in certain other areas of West Bengal. In this system a cavity 4 to 5 feet deep is excavated and lined with mats made of split bamboo pieces. After stocking the fish more mats are placed on the top and the cavity is covered with earth. In the weekly *shandies* in South India cured fish received from producing areas in bundles are stored as such till the *shandy* day (see upper plate facing page 108) when they are opened and exposed for sale. In certain secondary markets such as at Arkonam (Madras) and Sewari (Bombay) rented godowns are used by merchants to store fish. The godown at Arkonam belongs to the Railway Administration while those at Sewri are owned by the Bombay Municipality. The godowns at Sewri consist of over 50 rooms each measuring 20 × 10 feet. They are permanent structures and are

maintained in good condition. Attached to each godown is a yard used for unpacking, cleaning and drying fish that are received and packing the same for despatch.

In the case of preserved fish 2-3 weeks in the carry-over period during which it reaches the consumer. Bulk of the stock is released during October to March, but this is not carried over beyond April in most of the areas. Stocks are almost negligible during the monsoon months, except in West Bengal where dried fish are consumed during rains and special storage methods are adopted to prevent deterioration due to moisture.

Fish oil is usually stored in kerosene tins, or in large drums which when full are sold along with the containers.

Preserved fish are liable to insect and bacterial attack. Losses in storage due to these reasons are estimated at about 1 per cent. If pronounced deterioration has taken place merchants sell such fish only as manure at very low rates.

F—Transportation

All means of transport commonly employed for carrying other agricultural produce are used for transporting fish, also. The chief forms are head-loads, *bahangis* (shoulder slings), bicycles, pack-animals, pony-carts, motor-vehicles, railways, boats, steamers as well as bullock-carts, Carp seeds and some of the aquarium fishes are being transported by aeroplane also. The use of a particular means of transport depends upon the distance to be travelled, the quantity of fish, facilities available for quick and safe despatch and the expenses that have to be incurred. In view of the scattered production of fish the extent to which each mode of transport is utilised varies according to local conditions even from day to day. This coupled with the uncertainty regarding the total catch that may be landed make the problem of transport all the more difficult for the agencies concerned in the assembling and despatch of supplies.

(1) BY ROAD

The transport of fish by head-loads is common in all producing areas. Fishermen or their relations carry fish in baskets (See lower plate facing page 109) to the wholesaler's premises village markets or when hawking from house to house. When a larger quantity viz., 2 maunds has to be transported five miles and over, *bahangis* are generally used. (See upper plate facing page 110). As the producers or the petty dealers invariably carry the fish themselves, no extra cost is incurred for the transport of fish by head-loads or shoulder slings. Conveying fish on bicycles is becoming more and more popular. They are fast, can be used on foot-paths and can be taken directly to places where fish is landed. Usually about 2 maunds of fish are carried on a cycle. (See lower plate facing page 110). The distance covered is usually 10 miles but sometimes even 30 miles are covered in relays by three persons. Cycles are supplied by merchants

who may obtain them on hire. Transport by head-loads, slings and bicycles is confined to fresh fish. Pack-animals such as ponies and donkeys are employed to transport freshwater fish in Kashmir State, the Punjab, Uttar Pradesh and Andhra Pradesh. These animals are owned by members of the fishing party that goes to fish in inaccessible places in rivers, etc. This mode of transport is employed only over short distances not exceeding 15 miles; if the market is far away the fish is transferred to pony carts; motor-lorries or sent by rail from the nearest point where faster transport is available.

Pony carts are generally used in the urban areas. (See upper plate facing page 111). They are used to transport fish from the wholesale to the different retail markets in all towns and cities. But where good roads exist, these are also employed to bring fish from producing centres which may be 15-20 miles distant from the urban markets. They can carry up to 6 maunds and the producer or the merchant also takes his seat in the cart while carrying his supplies to the market. From Ponneri, Policat and other places fresh fish are brought in pony-carts to Madras.

In order to improve facilities for the transport of fish by road the State Governments, wherever possible, may undertake construction of feeder roads from fish landing centres to the road and rail-heads.

Motor-lorries are utilized, as a rule, for quick despatch over distances of 100 miles and over. They are advantageously employed when a whole lorry can be loaded with dry fish as for example from west coast fishing centres to Coorg, Mysore, Coimbatore, etc. In most parts of the country, as passengers generally object to sit in buses which carry a basket or two of fish as freight, the movement of small lots of fresh fish by this means to town markets is practically negligible. If 8 to 10 maunds of fresh fish can be assembled and the distance to be transported is 40-50 miles small motor-cars are generally pressed into service, *e.g.*, from Tada, Arambakam and Sulerpeta, etc., to Madras City. There is no fixity in regard to the rates charged for the transport of a full lorry-load of fish. The charges vary from tract to tract depending upon local conditions and competition from alternative means of transport. For longer distances and full loads the rates are cheaper than for shorter distances and smaller loads.

Some States notably Madras are running fish transport vans for giving quick transport facilities to fishermen to transport their catches from fishing centres to the city markets. During 1955-56, 12,840 cwt. of fish were transported by these vans.

Bullock-carts are used only for transporting heavy bundles of cured or dried fish. They are slow but 20-25 maunds can be carried at a time. They are employed to haul parcels to railway despatching centres or from railway stations to markets. (See lower plate facing page 111). In South India, preserved fish are carried in bullock carts from producing areas to assembling markets which may be 50 to 60 miles distant. Here also the charges work out lower when full cart-loads are transported over long distances.

(2) BY WATER

Except in a few areas, transport of fish (especially fresh fish) by water, is confined to the carriage of fish by boats from the point of fishing to the nearest points where a better means of transport is available for its conveyance to the assembling or consuming markets. This is common only in river fishing and as fishermen themselves either row or tow the boat to the appointed centres, no extra expenses are incurred by assembling merchants on this score. In the Sunderbans in West Bengal, however, boats are the only means of transport and fish have often to be carried several miles till rail or steamer heads such as Diamond Harbour, could be reached. Nikaris usually go about in boats and purchase fish from owners of fishing wiers. As ordinary boats are slow-moving special boats fitted with a number of paddles are employed for this purpose. (See upper plate facing page 109).

Boats are used for transporting cured or dried fish and live fish in river districts of West Bengal, Surma Valley in Assam (See lower plate facing page 14) in the coastal eastern districts of Madras and in the backwater area of Cochin and Travancore. Fish consignments consisting of mainly prawns are transported from Pulicat to Madras by small boats. These boats have usually a carrying capacity of 15 maunds. Boat transport is the cheapest; at the same time is the slowest. In a navigable river or a deep canal, the rate of travel is faster than when the boat has to be towed with ropes from the banks.

River steamers which ply in the navigable rivers of West Bengal, Bihar and Assam carry fresh fish. The freight charged is fixed according to the distance and concessions such as carriage at three fourths of the usual parcel rates, facilities for returning empty containers and special rates between particular points are allowed by the steamer companies. The coastal service steamers sometimes bring fish from Veraval and other centres in Kathiawar to Bombay city.

Fish-products from Arabia are brought to ports on the West Coast of India in sailing vessels. A major portion of the export trade between India and Ceylon is also handled by sailing schooners.

(3) BY RAIL

This is the most important means of transport employed for carrying fish over long distances. Fresh fish is accepted for transmission by rail and fast passenger trains. Dried and salted fish are also booked for transport by passenger trains. In most parts of the country dried and salted fish are, however, carried by goods trains. There is a general tariff of rates for carrying luggage and parcels by passenger or mail trains based upon distances and weights. These rates are fixed by the Indian Railway Conference Association and with the approval of the Railway Board are generally applicable to all the railways in India. Fish are charged at half parcel rates on gross weight, *i.e.*, fish *plus ice plus* container, at owner's risk and pre-payment of the freight is compulsory. Consignments of fish are brought on head-loads, *bahangis* and in carts to the railway station by merchant's coolies.

Being a perishable commodity, booking and delivery are open on all days of the week. The railways require that the parcels should be packed in durable containers, properly tied and labelled. If, however, risk rate form 'A' is executed (which absolves the railways of all responsibility of loss, damage, etc. to the consignment arising out of defective packing) insecurely packed parcels are also accepted.

The handling of fish parcels between the parcels office and the train both at the despatching and receiving stations is part of the service performed by the railways. The merchants, however, assist the railway staff to load the parcels with their own coolies in view of the short halt at many of the consigning stations. During transit the consignments are placed in the Brake-Vans of the mail or passenger trains. In most cases the parcels are piled one over the other. On reaching the destination the fish parcels have to be removed from the station premises within 24 hours or even earlier if they are likely to become offensive. If they remain unclaimed beyond the above period the station authorities are empowered to auction them at the owner's risk and expenses. The merchants, therefore, take it a point to call at the Parcel Office at appropriate times to clear away parcels they expect to have arrived. In many places the parcel staff often arrange to send the consignments to merchant's premises, should they fail to turn up. The way-bills are surrendered as soon as they are received by post. Quite often way-bills are tied with a piece of thread to the fish consignments.

As a rule, only preserved fish are consigned by Goods Train. The general rule for the acceptance and carriage of fish, by Goods Trains have also been drawn up by the Indian Railway Conference Association. Freight is chargeable at the rates notified from time to time by the Railway Administrations.

There are a few other special facilities provided by the railway authorities. These comprise (i) laying down dimensions for standard containers to obviate the necessity of weighting each parcel (ii) carriage of ice at reduced rates for use in packing fish and (iii) issue of third class monthly and quarterly market Vendors Season Ticket to important Urban consuming centres from stations up to 100 miles distant. Over the Railways the holders of Market Vendors' Season Tickets can carry without any additional charge (a) 60 seers ($1\frac{1}{2}$ mds.) of market produce such as fish, vegetables fruit, etc., on the forward journey and pay for market produce in excess of 60 seers at half parcel rate (b) 25 seers of luggage including ice up to 10 seers, and empties, etc., on the return journey. Special Market Vendors' Vans are attached to morning suburban trains arriving at Bombay and Calcutta.

Special facilities for transport of fish seed has been provided on Railways. Suitable instructions regarding quick transport of fish seeds by fast trains and permission to carry a small number of pots or tins with fish seeds have been issued to various railways. These facilities can be availed of by approaching the Railway Administrations who would no doubt assist to the extent possible subject to the availability of accommodation.

In order to provide adequate facilities for refrigerated transport of fish catches from collection centres to large consuming centres, proposals were made to introduce 6 insulated rail-cars during the Second Five Year Plan period. Two rail-cars will operate on each of the following routes :—

Balugan—Calcutta
Kozhikode—Madras
and
Bombay—Delhi

Having realised the importance of transport of fish by rail it was resolved at the All India Fisheries Conference in 1956 that “(1) the Railways be requested to introduce refrigerated rail vans on all routes connecting important landing centres and areas of consumption, (2) fish be transported by fast trains on all railways, (3) the quotas allowed for the transport of fish at the various stations be made more flexible during the different fishing seasons, with provisions for increasing the quotas, where necessary, (4) the freight rates for fish be fixed at quarter parcel rates in view of its highly perishable nature”. These recommendations were further endorsed by the Conference of State Ministers for Fisheries in 1957.

Occasionally some private firms transport fish along with other cold stored provisions in their own refrigerated vans, but the traffic is negligible.

(4) TYPES OF CONTAINERS AND PACKING MATERIALS USED IN THE FISH TRADE

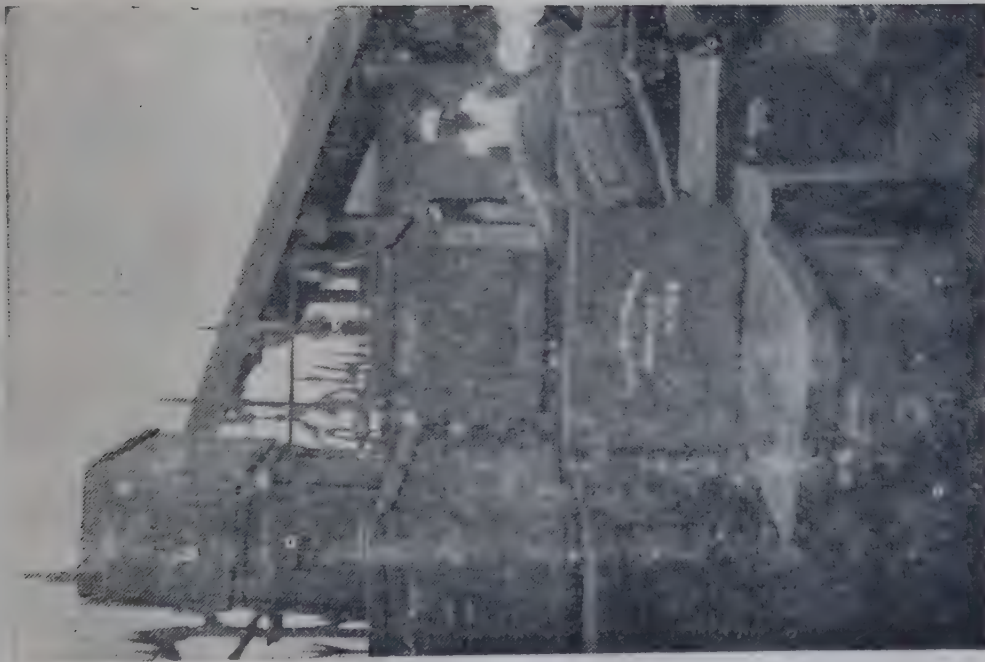
The containers generally used in the fish trade are (a) net, (b) baskets, (c) wooden cases, (d) gunny bags, (e) earthen pots or kerosene oil or round tins, (f) coconut palmyrah and screw pine leaf-mats, (g) plastic bags or polypack poly-thin bags.

(a) Nets are used chiefly in the producing areas for carrying small quantities of fish from boats (See upper plate facing page 33) etc. to the assembling centre or near-by markets. In certain areas large masses of fish are kept alive in water in bag nets staked near the shore from which quantities are removed according to requirements.

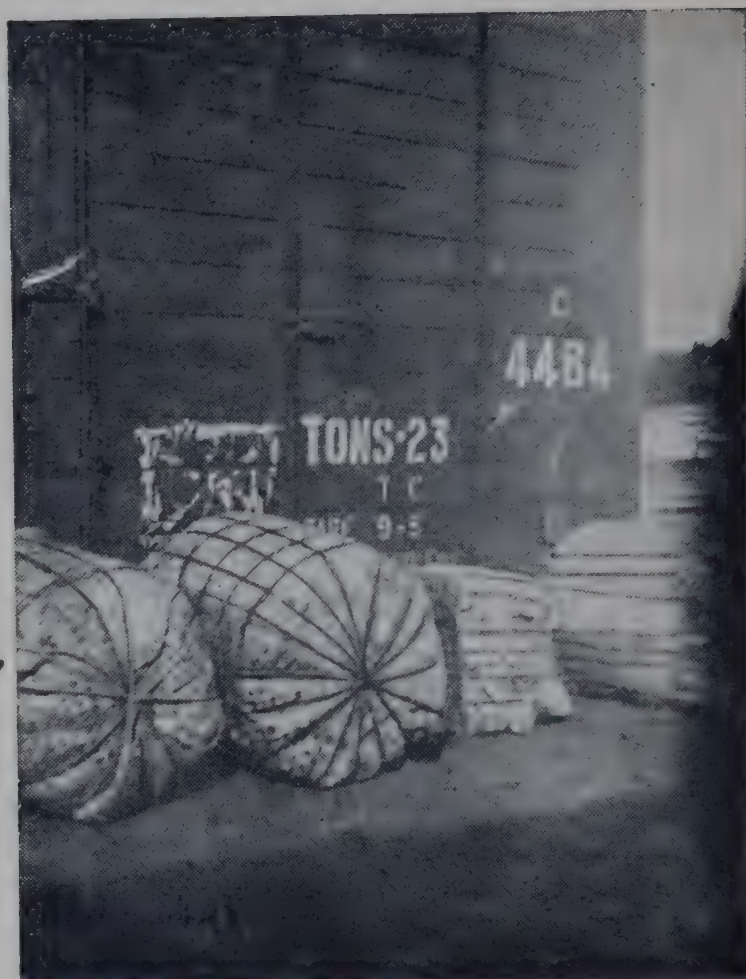
(b) Baskets are in universal use in the fish trade. These are generally made of bamboo strips, but their rigidity, size, shape and cost vary. Occasionally materials like *pilchi* twigs (*Tamarix gallica*) are also used for basket making. For transporting fish from landing ghats to the assembling centres large shallow bamboo baskets are used. In Malabar it is generally observed that a piece of the flattened leaf stalk of the arecanut palm is stitched to the under-side of the basket to collect any water which might drain from the fish. Deep baskets are used for sending fish over large distances. When ice is not used, the system of packing is simple. Fish are placed in the basket and the



SALTED FISH PACKED IN PLAITED COCOANUT LEAVES
FOR TRANSPORT BY RAIL TO INLAND MARKETS
IN MADRAS PROVINCE.



BOXES USED FOR TRANSPORTING FISH IN ICE TO
THE CRAWFORD MARKET, BOMBAY.



SALTED FISH PACKED IN SCREW-PINE LEAF MATS FOR EXPORT TO CEYLON.

open mouth covered with a piece of gunny cloth which is stitched to the edge of the basket. Market vendors only place some green leaves below and over the fish when they accompany the consignment.

For long distance transport, especially during the summer months, fish is packed along with ice in baskets. These baskets are generally made of split bamboos closely knit together. Lids of the same material are also provided. Fish and broken lumps of ice are placed in alternate layers, and when full, the lid is put on and firmly tied with coir or *munj* ropes. The baskets used to transport *Chilka* fish to Calcutta are provided with two stout bamboo handles. The cost of basket varies from 25 nP. to as much as one rupee each depending upon the type, material used and capacity. Strong baskets used in the iced fish trade are returned when empty to the producing centres and are re-used.

(c) Wooden cases are used mostly by commission agents and whole-sale merchants for despatching supplies in ice, by rail, to distant markets. (See lower plate facing page 116). Cases which have once been used for packing fruits, soaps, cutlery, etc. are generally used for this purpose. The method of packing fish with ice is the same as in the case of bamboo baskets. The quantity of ice used depends upon (a) the season—a larger quantity is used in summer, (b) the type of fish, (c) the distance to be transported, and (d) the time of sale of the fish. During transport over long distances involving transshipment, arrangements are often made in West Bengal to add more ice at intermediate stations and the steamer companies and railways provide facilities for the same. In the case of consignments that reach the consuming centre too late for immediate sale the consigner generally puts more ice in advance so that fish could be stored undisturbed till sale can be effected.

The empties are returned and are used repeatedly, after minor repairs, if necessary, till they become unserviceable. Second-hand packing cases with a gross capacity of 1 3/4 maunds (tare 5 seers), cost from Rs. 1·50 to Rs. 2·50 nP. "Standard" boxes used in West Bengal are considerably heavier being approximately 1/5th the gross weight of the filled containers.

Baskets are cleaner, lighter and cheaper than boxes. Merchants and commission agents take into account the freight and durability when deciding upon the type of the container to be used. The empties, whether baskets or boxes are not washed or disinfected before a fresh lot of fish is packed into them. For the hygienic point of view, a cheap non-returnable container would be the best. The need for developing suitable packaging for fresh fish has been stressed by the Conference of State Ministers for Fisheries held in 1958.

(d) *Gunny bags*.—The use of gunny bags is confined to the transport of large fresh water fishes from producing centres to nearby consuming markets. These are obtained second-hand from grain merchants. Fish is put in the bag and the open end is stitched with hessian thread. Being

a non-rigid container, its disadvantages are obvious. Fish guano and manure are always packed in gunny bags. The cost of a gunny bag varies from Re. 0·75 nP. to Rs. 1·20 nP.

(e) *Earthern pots and kerosene tins.*—These are used in the transport of “live fishes”. Kerosene tins are preferred when those have to be sent by rail. Round tins are used in some States like Uttar Pradesh. The earthern pot or tin is more than half filled with water, the fish is put in and the opening secured with a piece of net or some other open-meshed material. During summer more water is put in than in winter. Freight, is charged on actual weight, *i.e.* fish *plus* container *plus* water.

Kerosene tins are universally used as containers for fish oil. The cost of a kerosene tin varies from Re. 1 to Rs. 2.

(f) *Coconut, palmyrah and screw-pine leaf mats.*—These are used for packing dried fish. Plaited coconut leaves are very cheap, but are lacking in strength (See upper plate facing page 116). They are, therefore, used only when the distance to be transported is small and there is no transshipment or likelihood of rough handling. Screwpine mats are stronger and all salted and dried fish sent to Ceylon from the West Coast are packed in screwpine mats. (See plate facing page 117). While plaited coconut leaves (45" × 18") cost Rs. 3 per hundred, palmyrah mats (30" × 15") cost Rs. 4 and screw-pine mats (60" × 42"), Rs. 10 to Rs. 12 per hundred. The packages are of various sizes and shapes. The preserved fish is firmly rolled in mats and secured with coir ropes. Fish does not remain for more than 2 weeks in such bundles and its quality is not seriously impaired. The cost of packing varies from Re. 0·75 nP. to 1·25 nP per bundle. The bundles, however, go out of shape owing to the piling up, one over the other in wagons.

(g) *Plastic bags or poly pack poly thin bags.*—Plastic bags filled with oxygen are being used for transportation of fish seed and aquarium fishes, during the past few years in many centres of India. The use of these bags are getting more popularity due to its efficiency, cheapness and also not being subject to breaking during transit. These bags are being manufactured in Bombay and Calcutta and the raw material is being imported from foreign countries *e.g.* U.S.A. and U.K. the use of plastic bags is being gradually replaced by another cheaper product known as Poly pack poly thin bags. Information from the trade reveals that the bags manufactured at Bombay are of better quality to that of Calcutta. The wholesale rate for 1,000 bags or more ex-Calcutta or Bombay godown comes to Re. 0·63 nP each. The retail price comes to Re. 0·75 nP. each. The size of the bag being 27" × 9" × 9".

The Fish Seed Syndicate Ltd., Calcutta, sponsored by the Government of India's Fisheries Extension unit charge Re. 1 per bag and Rs. 2 per tin carrier with lid while supplying fish seed to various States. Usually 1,100 fish fry of 1" size are being put in each bag during transit. The number of fish fry can be doubled if the size is $\frac{1}{2}$ " or less and the journey involves 3 hours only and that too during the night.

G—Merchandising charges**(1) RURAL MARKETS**

The fishermen incur very little by way of market charges. When they take fish to a village market or a weekly shandy they are required to pay 3 nP to 12 nP. to the market leasee. In many markets in South India separate scale of charge is fixed for cured or dried fish. The Market charge for fresh fish is fixed per vendor, whereas, that for cured fish is computed on the weight basis, and it varies from 3nP per maund to 25 nP per cart-load. No other expenditure is, however, incurred by the producers. Buyers have not to pay any charges in the rural markets.

(2) IN LARGE ASSEMBLING AND DISTRIBUTING MARKETS

The Merchandising charges which a seller has to pay at terminal markets amount approximately to 25 per cent of the value of the produce.

The merchandising charges may be classified into (a) charges incurred by country dealers in consigning fish to the commission agents (b) charges of commission agents recovered from sellers for taking delivery of the goods and selling them off.

(a) *Charges incurred by country dealers in consigning goods to commission agents:* These vary from place to place according to the type of the commodity, local conditions, means of communication, etc. The usual ranges are indicated in the following table.

TABLE NO. 34

Charges incurred in despatching one maund of fish to the other market

(Data relate to 1957)

Items	Bombay to Calcutta	Calcutta to Delhi	Delhi to Calcutta	Jullundur to Calcutta	Delhi- to Amritsar
	Rs. nP.	Rs. nP.	Rs. nP.	Rs. nP.	Rs. nP.
1. Cost of Container (Basket, bag or box).	0.37	0.37	1.00	2.50	2.00
2. Ice	2.00	1.75	1.00	3.00	2.00
3. Packing charges	0.50	1.66	0.70	0.75	2.75
4. Transport to Railway Station	..	0.34	0.50	0.50	..
5. Station Expenses	0.50	0.37	0.37	..	..
Total	3.37	4.49	3.57	6.75	6.75

(b) *Charges of Commission Agents recovered from sellers for clearing the consignments and selling them off:* These comprise the following items :—

- (i) clearance and cartage charges,
- (ii) octroi, terminal tax, etc.,
- (iii) commission,
- (iv) charity, and
- (v) miscellaneous charges.

(i) *Clearance and cartage charges.*—These are incurred by commission agents in the distributing markets on behalf of their clients for taking delivery of the parcels and transporting them to the markets or *mandis*. Generally a sum upto 6 nP per parcel is paid to the railway personnel for the unofficial services they render. The transport charges amount from 0·50 nP to Re. 1 per maund. Dried fish parcels are carried in bullock-carts and the expenses incurred on this score are smaller.

(ii) *Octroi, etc.*—In most places in Northern India, a municipal toll, terminal tax or octroi duty is levied on goods arriving within the limits of the municipalities, cantonments and notified areas. The rates charged for fish per maund vary from place to place and their range of variation is between 12 nP to 25 nP. The Simla and Jullunder municipalities, however, charge Rs. 2·00 per maund which are the highest rates charged in India. In the Bombay State terminal tax is charged only on arrivals of dried fish.

In the Madras State, Local Boards are empowered to levy a fee not exceeding Rs. 5 per annum in respect of public fish-curing yards used for storing or curing fish and one rupee in respect of any private store-house used for storing and trading in fish and fish products. There is no Octroi levied in case of West Bengal State.

(iii) *Commission.*—This is the main item of expenditure and varies from 3·12 to 10 per cent of the gross sale-proceeds. The merchants in Madras city pay a fixed commission per parcel of iced fish irrespective of the value realised on auction. In most of the states 6 nP per rupee worth of fish sale is charged. In Calcutta the charges vary from 3 nP to 6 nP per rupee of gross sale.

(iv) *Charity.*—Under this item a charge is levied which is said to be used for religious purposes. This deduction varies from 3 nP to 10 nP for each container. In Calcutta and Howrah wholesale markets, the charge ranges from 6 nP to 10 nP per basket or box of fish. The amount goes to the commission agents association. In some of the States this amount is supposed to be used for entertaining the fishermen who are not able to return to their places on the same day after delivering the fish at the market.

In Calcutta and Howrah wholesale markets 'brithi' is charged amounting to 8 nP to 16 nP per consignment of fish received by the commission agents. The amount goes to the *artdars* association where it is said to be used for 'puja' function.

(v) *Miscellaneous charges*.—These comprise the godown rent, sales tax, "karan" dues, 'hisabana' (for maintenance of accounts) postage and a commission of 50 nP per 100 rupees for "Changing notes and rupees". The first four are usually levied on an *ad valorem* basis. However, in Calcutta and Howrah wholesale markets 'hisabana' ranges from 6 nP to 25 nP per challen which may relate to one package or more.

Separate charge is levied for ice storing of fish per night which would be according to the quantity used and the rate of ice at those places. In Calcutta the icing charges per night storing of fish varies from Re. 1 to Rs. 1·50 nP. per maund.

The following two examples illustrate the expenses that are generally incurred :—

Example 1.—Charges incurred on one basket of prawns containing 1 maund of prawns valued at Rs. 96·29 nP sent packed with ice from Howrah to Delhi.

	Rs. nP.	Percentage to total charges
1. Packing material and basket	1·50	6·6
2. Packing and Cart-hire	1·00	4·4
3. Ice (1 maund)	2·00	8·7
4. Babu and cooly	0·37	1·6
5. Commission on Rs. 96·29 @ 6· $\frac{1}{4}$ %	6·00	26·2
6. Railway freight on 2 mds.	11·00	48·0
7. Hisabana	0·06	0·3
8. Postage	0·15	0·7
9. Terminal tax at Delhi	0·31	1·3
10. Station charges and transport at Delhi	0·50	2·2
Total	22·89	100·0

Example 2.—Charges incurred in sending 2 maunds of cured mackerels, valued at Rs. 54·00 from Damaskudi to Paramakkudi sold for Rs. 68·60 at the Paramakkudi wholesale ket.

	Rs. aP.	Percent to tot. charge
<i>At Damaskudi</i>		
1. Packing materials	1·00	
2. Packing and cart-hire	1·87	
3. Station charges	0·50	
<i>At Paramakkudi</i>		
4. Mahimia	0·12	
5. Cart-hire and cooly charges	1·75	
6. Postage	0·12	
7. Commission	6·50	
8. Clerkage	0·12	
9. Sales Tax	1·06	
10. Railway freight	1·50	
11. Miscellaneous	0·06	
Total	14·60	100

H—Distribution

Consumers receive their supplies of fish through one or other of the following agencies :

- (a) Fisher-folk.
- (b) Village merchants.
- (c) Curers, commission agents and wholesale merchants.
- (d) Co-operative societies.
- (e) Retailers.

(1) FISHER-FOLK

The producers, *i.e.* relations of the fishermen take part in the distribution of fresh fish by hawking in the nearby village or towns, or by selling them in an improvised shop in a certain locality in the village or town. They get better prices in towns where there is a good demand for fish.

(2) VILLAGE MERCHANTS

The village merchants distribute fresh fish in much the same way as producers, disposing them to retailers, in villages and the curers and wholesale merchants in assembling markets.

(3) CURERS, COMMISSION AGENTS AND WHOLESALE MERCHANTS

These differ from producers and petty dealers in having proper preparation for their business and in handling large quantities of fish. A popular method of distribution practised by these merchants is to send consignments on commission account to *adatyas* in the consuming markets, who are authorized to sell the fish according to the instructions given from time to time. For such consignments the owner has to bear all expenses. In large centres like Calcutta, Bombay, Madras, etc., the distribution actually commences at the railway platform or just outside the railway station where wholesalers and retailers meet every morning. After settling prices, often by an auction, the retailers take away the consignments directly from the platform.

(4) CO-OPERATIVE SOCIETIES

The part played by Fishermen's Co-operative Societies in the assembling and distribution of fish is not much. A reference has already been made under 'Assembling' to the mode of operation of a few typical societies.

(5) RETAILERS

In towns and cities retail sales are made from the shops of wholesale distributors and retail merchants. These shops generally sell poultry and eggs. The shops may be either in a street or in a municipal market and are visited by consumers direct. In municipal towns there is usually a municipal market in which a separate section or a few stalls are set apart for fish. The stall rents vary according to the size as well as the location of the stall in the market. The retailers have to abide by the regulations of the municipality regarding wholesomeness of the fish sold. In Madras State Inspectors of Fisheries are empowered to check the qualities of fish in the market and licences.

In most of the municipalities, cantonments and notified areas, hawkers and retail shop-keepers of fish are licensed. The license fee varies from place to place.

In West Bengal, Orissa, Madras and Bombay States women carry on the retail sale in the shops. A kind of bent knife fixed in a wooden board, a few baskets and earthen pot containing water constitute the retail paraphernalia in a shop. Where fish is sold by weight a pair of scales and the usual set of weights would also be seen. Two small shallow baskets generally serve as pans for the balance. After sale, the seller would remove the fins and scales and cut the fish into pieces according to the customer so desire. This service is done free. The cut pieces are wrapped in a paper and carried home. In the case of small varieties, the usual procedure is to pass a string through the gill openings and carry the fish home dangling on the string.

I—Total charges incurred in the marketing of fish and price spread from producer to consumer

The method by which consumers get their supplies of fish have already been discussed. Price spreads for some of the typical instances collected during recent years, in the marketing of fish, are given in appendix XXII. In the first example, the producer within a few miles of the consuming market (Gauhati) brought his catch to the assembling centre, where it was bought by a petty merchant. The fish was sold by the latter in the consuming market, with the assistance of a commission agent who auctioned it to a retailer from whom the consumer got the supplies. The producer's share in the consumer's price was relatively high, in this instance amounting to 76·2 per cent. Similar was the case in the case of the second example where the producer was equally at short distance of the consuming market at Nowgaon. In the third and fourth examples, the fish were railed from Buxar (Bihar) and Balugan (Orissa) to Calcutta and the producer's share in the consumer's price was 52·4 per cent and 53·6 per cent respectively. In the fifth example when fish was sent from Metturdam to Madras the producer's share was only 44·7 per cent of the consumer's price. It will thus be seen that the cost of distribution increases according to the number of times the commodity changes hands before it reaches the final consumer. The share of the transport agencies depends on the distance between the assembling and the consuming markets. A fairly large proportion of the price paid by the consumer goes to the intermediate agencies. This, therefore calls for organisation of fish cooperatives to assist the producer seller in realisation of better prices. The establishment of regulated markets for fish will also help in minimising the marketing costs and also assure the seller of fair market practices.

J—Finance of the fish trade

Of the different agencies engaged in the organized assembling and distributive trade of fish, the wholesale merchant at the producing areas and the commission agent in the consuming markets constitute the chief financing agencies. Their earnings depend upon the extent to which they can attract regular supplies from the various sources and arrange for their remunerative and speedy disposal. To meet this end they generally (i) advance varying sums of money to fishermen and petty dealers in lieu of prior claim on the catch; (ii) give their boats and fishing nets to fishermen for a share in the catch; (iii) help fishermen with provisions or with materials for net making, *e.g.*, cotton, hemp, etc.; (iv) employ their agents to visit the various producing centres to buy the catch from fishermen; and (v) encourage small scale retailers and hawkers to distribute the fish. Although fish merchants do not generally advance money to small-scale retailers and hawkers, they provide them with sufficient quantities of fish for retail distribution and realize the cost of fish at whole-sale rates applicable after the fish has been sold.

Wholesalers and commission agents have also to meet the cost of packing material, salt, curing expenses, and pay railway freight, etc. To meet all these they require finance. Generally they have their own

capital. Sometimes, they borrow from local *sahukars*. These loans are advanced to them only against some substantial security and not against their assets connected with the actual fish trade.

At present banks do not give loans to fishermen or fish merchants except when material unencumbered assets like jewels, property, etc. are tendered as security.

Though the Bye-laws of certain societies permit borrowing to the extent of 5 to 7 times the share capital and reserve fund, the co-operative societies at present, play only a minor part in the finance of fish marketing.

K—Government credit facilities for fishing industries

The Fisheries Division and the Grow More Food Section of the Ministry of Food & Agriculture, Government of India, the State Fisheries Departments and the State Cooperative Departments are concerned with the administration of credit facilities. The Ministry of Food and Agriculture, Government of India finances both the development schemes as well as the Grow More Food Schemes. The State Governments in addition to executing the schemes, also make additional provisions to supplement the funds received from the Centre. The Co-operative Central Banks provide loans to a very limited extent.

Credit facilities under 2nd Five Year Plan schemes.—Under the Second Five Year Plan programme a provision of Rs. 12 crores existed for specific fisheries development—Central and State schemes such as assistance to fishermen's co-operative societies for marketing of fish, salt subsidy schemes, improvement of fishing crafts, supply of nylon nets, provision of ice plants, quick transport facilities, construction of model fish markets, training of personnel, etc.

The individual fishermen, merchants, processors and retailers depend on the wholesalers or auctioneers for credit and are not at present entitled to any credit facilities provided by the Government. Only fishermen who are members of the cooperative organisations can avail of the credit facilities provided by the Government through their societies.

Trainees who have been trained in off shore fishing at various off shore fishing training centres are supplied mechanised boats under hire purchase agreement by the Cooperatives. Importance of a particular fishing centre may make a cooperative society eligible for receiving Government loan for setting up a fish curing yard or godown. The main criteria for issue of loans are the solvency of the member, his reputation in the community, his capacity to pay and his essential needs.

Long term loans are issued to individual members or fishing units in cash and in kind for the following purposes:—

- (i) clearing partly their prior debts to money lenders and,
- (ii) purchasing fishing equipment such as crafts and tackles and other requisites for fishing.

Long term loans are also utilised by co-operative societies for purchasing or constructing buildings such as godowns, curing sheds, etc.

Medium term loans are given to inland societies for purchase of crafts and tackles and for discharging prior debts. Short term loans are made use of for repair of crafts and tackles and for other miscellaneous day to day expenditure.

Normally a sum of Rs. 14,000 is provided to each Fisherman's Co-operative society with members ranging from 100 to 200. The limited funds are utilised to the maximum capacity and are made available to as many fishermen as possible according to their needs. The amount received by each fisherman ranges from Rs. 100 to Rs. 200 though in rare cases it may be even Rs. 65 or Rs. 400. The proportion of this aid to the total requirements of the fisherman will vary from individual to individual.

Most of the Fisheries Co-operative Societies in India are credit societies and their functions are to obtain long term, medium term and short term loans from the respective State Governments, distribute them among the members and collect them in instalments. A few marketing federations issue short term advances either on pledge of produce or on the product entrusted to them for marketing and they are recovered within the period of contract which does not ordinarily exceed one fishing season.

Interest rates for the loans issued by the Central Government to the State Governments are decided from time to time by the Ministry of Finance depending on the nature of the loans and the purpose for which the loans are asked for. For example, long term loans repayable within a period of 10, 15 and 20 years are issued at the rates of 4 per cent, $4\frac{1}{4}$ per cent and $4\frac{1}{2}$ per cent per annum respectively, medium term loans repayable within 5 and 7 years are charged $3\frac{5}{8}$ per cent and $3\frac{7}{8}$ per cent respectively and short term loans repayable in 18 months are charged $3\frac{1}{8}$ per cent per annum. The rates of interest collected by the State Governments from the societies also vary from State to State. Loans that are directly issued by the Governments are available to the fishermen at the rate of 5 to $6\frac{1}{4}$ per cent whereas those that are routed through the apex and central banks are available only at a higher rate of interest. The societies generally charge additional 2 per cent interest to the members who receive loans under these schemes.

In the case of long term and medium term loans repayments are to be made by the State Governments to the Central Government in annual equated instalments. The co-operative societies collect long term and medium term loans during the specified number of years at the rate of 8 instalments per year. The instalments are not collected during the non-fishing season the duration of which is generally 4 months in a year. Short term loans are cleared within a specified period in as frequent instalments as possible.

Grow More Food Schemes.—Apart from the Plan allotments grants and loans are also provided under the Grow More Food Schemes. The amount of Rs. 52·33 lakhs (Grant Rs. 19·06 and loan Rs. 33·27 lakhs) was sanctioned for the year 1956-57 and Rs. 64·43 lakhs (grant Rs. 29·10 and loan 35·33 lakhs) for the year 1957-58 under this scheme.

Loans under the Grow More Food Scheme are also generally routed through the co-operative societies. Loans for financing private companies are also given under fisheries development provided the assets of the companies are adequate and the management is on proper lines.

Under hire purchase system only boats and engines are issued to the co-operatives. The co-operatives may operate them directly through the members or may issue them to groups of members under hire purchase agreement. The period of repayment is usually 5 years. The property, however, rests with the Government till the loans are fully paid. Any damage caused to the property prior to repayment of the loans is recoverable from the societies or members concerned. In certain cases groups of members have taken the boats on the security of immovable property.

Loans issued by the societies are generally on the mortgage of boats and nets and immovable property, if any. In the absence of any immovable property loans are issued on the surety of one or two solvent members. No insurance arrangements are, however, made in this connection.

Co-operatives.—The co-operative banks also supply credit to certain well-established co-operative societies on the security of Government Promissory Notes and in a few cases loans have also been given on the strength of the share capital and reserve funds. The bulk of the credit, however, is obtained privately from members either in the form of fixed deposits or as loans. In rare cases, the State Governments have provided credit by contributing substantially to the share capital of the societies. In any case the extent to which loan can be obtained is restricted by the bye-laws of each society and is generally confined to 4 to 5 times of their share capital and reserve funds and in exceptional cases up to 10 times.

Short term loans are issued by the Central Co-operative Banks at 6½ per cent and the societies may fix the rates of interest up to 9½ per cent according to the paying capacity of the members.

CHAPTER VIII—MISCELLANEOUS

A—Activities of the fisheries departments

(1) HISTORICAL

During sixties of the last century a number of dams and weirs were constructed in South Indian rivers. Sir Arthur Cotton who was in charge of these projects expressed a fear that the dams might adversely affect the local coastal and inland fisheries. On his representation the Government of India deputed Dr. F. Day to investigate the freshwater fishery resources of South India. Later on Day was asked to go into the question of the fisheries of the whole of India and Burma. Day published two reports in 1873: the "Freshwater Fish and Fisheries of India and Burma" and the "Sea Fish and Fisheries of India". In the report on freshwater fisheries he drew attention to the widespread slaughter of breeding fish and fry and urged legislative measures to conserve the fisheries. After a lengthy correspondence with the Local Governments, the Indian Fisheries Act (Act IV of 1897) was passed (see appendix No. XXIII) for the whole of India (except Burma), by which dynamiting and poisoning of waters for killing fish were absolutely prohibited. The Act empowered Local Governments under certain conditions to frame rules for regulating (a) the erection and use of Fixed Engines, (b) the construction of weirs, and (c) the dimension and kind of nets to be used and the mode of using them; and, for prohibiting all fishing in any specified water for a period not exceeding two years. In regard to sea fisheries Day's endeavours resulted in the grant of duty free salt for curing fish within fenced enclosures.

The Madras Government viewed that fisheries, an important food industry, demanded special attention, especially as it was in the hands of a backward community without capital or initiative and deputed Sir F. A. Nicholson in 1905 to investigate the fishing industry, both inland and marine of the State. As a result of this investigation, a small department of fisheries was constituted by the Madras Government in 1907 with Sir F. A. Nicholson as its first honorary Director. A considerable amount of detailed and useful work has been carried out by the Madras fisheries department in respect of preservation of fish under Indian conditions and for the uplift of the fishing population.

Other States followed Madras in the matter of fishery investigations. Sir K. G. Gupta enquired into the fisheries of Bengal (including Bihar and Orissa) in 1906; Mr. W. H. Lucas into the fisheries of Bombay (including Sind) during 1908-1910 and Mr. H. S. Dunford into the fishery resources of the Punjab in 1911. A report on the fisheries of the United Provinces by Mr. E. H. H. Ddye was published in 1923, of Baroda by Mr. James Hornell in 1930 and a revised report on the Marine fisheries of the Bombay (including Sind) Presidency by Dr. H. T. Sorley in 1931.

In Bengal Sir K. G. Gupta submitted his final report in 1908 recommending artificial propagation coupled with a system of short closed seasons and other protective measure for freshwater fisheries and the

exploration of the Bay of Bengal by the Government, to find out where marine fish are to be found and investigations into how they should be caught and brought to the market. The Government of Bengal accepted the recommendations and appointed a fisheries Commissioner and an European Expert to carry out the investigations. A trawler survey of the head of the Bay of Bengal was immediately taken in hand and several investigations into the freshwater fisheries of Bengal and on Hilsa fish were undertaken. The Department of Fisheries, Bengal, Bihar and Orissa was, however, abolished in 1923. During 1938, the existing condition of the fishing industry of the State was again investigated by an expert from the Madras fisheries department and the Bengal Government, in May, 1942, revived the fisheries department with a view to organising the fish trade under War conditions, to conserve the existing supplies and to improving the yield of tank fisheries. After partition of Bengal in 1947 the fisheries Directorate in West Bengal was placed under the Director of Agriculture. Now there is a separate department of fisheries.

Mr. Lucas made several suggestions regarding marine fisheries of the Bombay (including Sind) Presidency but the only practical result which followed was an extension of the use of duty-free salt for the curing of fish at sea. As a result of Dr. Sorley's recommendations a fisheries Officer was added to the staff of the Industries Department to investigate the easy enlargement of the fish curing industry and to extend to suitable local areas the use of motor-boats for fisheries or for transport of fish. Bombay has now a well organised Fisheries Department with necessary staff for conducting research on all aspects of fishery science.

In the Punjab, Mr. Dunsford wanted artificial propagation coupled with measures to prevent wasteful destruction of fish in order to increase fish supplies in the State. A fisheries department was constituted by the Punjab Government in 1912 which continued to exist as a separate entity till 1932. The duties are now carried out by a Warden of fisheries under the administrative control of the Director of Agriculture, Punjab.

Research in fisheries has been conducted in India by:—

- (i) The Central Fisheries Research Stations under the Ministry of Food & Agriculture, Government of India;
- (ii) State Fisheries Departments;
- (iii) Surgeon Naturalist to the Marine Survey of India;
- (iv) Zoological Survey of India; and
- (v) Zoology Department of Calcutta and Madras Universities and in the biological laboratories of certain colleges.

The Indian Council of Agricultural Research has been acting as a co-ordinating body in the matter of fishery research and in providing financial assistance to States for taking up research on fishery matters. During the past few years due to efforts of the Indian Council of Agricultural Research and the Fisheries Development Adviser to the Government of India, fishery investigations have been started in all States of India.

(2) FUNCTIONS

These may be considered under three convenient headings, viz., (a) Administrative, (b) Research, and (c) Socio-economic and other activities.

(a) *Administrative*.—In most States Fisheries Officers have to attend a great deal of routine administrative duties with the result that they are unable to devote themselves wholeheartedly to research and development. In Bombay, Madras, Kerala and Orissa the administration of fish curing yards claim the first attention of the fisheries staff. In non-maritime areas such as the Punjab, Jammu & Kashmir, in the interior of Madras State, etc. fishery officers are busy with conservancy duties of routine nature. These consist in administering the provisions of the local fishery Acts, issuing licences for fishing and leasing Government waters to private individuals. As local Governments have insisted on the fishery departments being self-supporting, it has not been possible for even the fishery experts to dissociate themselves from these revenue-yielding activities. But in the interest of research and its progress, it is very desirable that the qualified fish experts should be relieved of those duties and be allowed to concentrate on scientific, development and marketing problems. It was resolved at the All-India Fisheries Conference in 1956 that all States should have separate Fisheries Departments. This view was supported by the Conference of State Ministers for Fisheries held in 1958.

(b) *Research*.—Fisheries Research is a comparatively recent development in the scientific research activities of the Nation. The need to take up research as a responsibility of the centre so that the fishing industry could be fostered and developed along modern lines, was realised as recently as during the second World War when the whole country suffered very acute shortage of food.

The main divisions of research in relation to problems of fishing are (i) biological research dealing with living fish and their environment, (ii) technological research into methods of preserving fish from the time of capture to the time when it reaches the consumer, and (iii) research into the design and equipment of fishing vessels and nets.

Apart from the fishery research undertaken by States, like Madras and Bombay and schemes sponsored by the Indian Council of Agricultural Research the Government of India have now established Central Marine and Inland Fisheries Stations to carry out fundamental research on the biological, physico-chemical, technological and other problems confronting fisheries in India and to train the technical personnel needed for carrying on the fisheries development programmes of the States.

The Central Marine Research Station was established in 1947 to carry on research problems of marine fisheries with a view to estimating the resources, the rate of present exploitation, the possibilities of increasing production and utilization and recommending measures of conservation if necessary. The station was originally started at Madras but is now located at Mandapam in South India. The work of the Station

done at headquarters and at a number of sub-stations. The sub-station at Bombay specialises in research on off shore fisheries, that at Karwar on mackerel fisheries that at Kozhikode on fishery biology and on the oil-Sardine and mackerel fisheries, that at Cochin on prawn fisheries and that at Madras on molluscan fisheries. Biological and statistical data relating to fish landings are collected by trained survey assistants stationed at twenty different zones of the coast and are analysed at headquarters. Studies on marine biology, hydrology, utilisation of sea weeds, marine fish farming and on certain small fisheries are also carried on at Mandapam. The station is under the charge of the Chief Research Officer, who has a group of trained Zoologists, Botanists, Chemists, Bacteriologists and others to assist him.

The Central Inland Fisheries Research Station was also established in 1947 at Calcutta. The work of the station is broadly divided into three main sections, viz., Estuarine, Pond Culture, Riverine and lacustrine. The work of Estuarine Section and that of the Island Fisheries training, along with certain other activities, is carried on at headquarters while that of the Pond culture and the Riverine and Lacustrine sections is done at the sub-stations at Cuttack and Allahabad respectively. This station is also under the charge of a Chief Research Officer, who is assisted by a group of workers especially trained in different Branches of fisheries research.

A pilot deep-sea fishing station was established at Bombay by the Government of India in the year 1947 and an ice and cold storage plant which provides facilities for icing, storage and freezing of fish catches, was added in 1951. The vessels of the station have charted the fishing grounds off the coasts of Bombay and Saurashtra up to 40 fathoms line. It is proposed to undertake the charting of fishing grounds further south on the West coast and also on the East Coast with different types of fishing vessels. For this purpose, Exploratory Fishing Stations will be established at Cochin, Visakhapatnam, and Port Blair. Training in power fishing operations is provided on the vessels of the Central Deep-Sea fishing stations for fishermen and State Fishery Officers.

A fisheries Technological Station is being established to work on (1) designs and preservation of fishing nets and gear, (2) preservation, processing and utilisation of fish, and (3) establishing commodity standards and grades.

The Government of India are assisting in providing training in fishing from small mechanised boats and maintenance of engines at Satpati in Bombay State. Other training centres are being set up at Cochin and Tuticorin. Similar training is being provided by the Norwegian Community Project in Kerala State. It is expected to train 800 fishermen at these Centres.

(c) *Socio-economic and other activities.*—Development of fisheries as a source of food is naturally the chief object of every fishery department. The fisher-folk in India are in general at a very low stage of

social and economic development—their calling is despised; as a class they are poor and deeply in debt; they are ignorant and illiterate having in general neither schools nor teachers while their absence day and night at sea places them largely out of touch with the rest of the population. In Madras it was felt that the industry could develop along right lines only when the producers (fishermen) are raised in status, intelligence, independence and wealth. To meet this end elementary (special) schools for fisher-children and night schools for fishermen in important fishing areas, organization of co-operative societies and propaganda work in fishing villages against intemperance and extravagance were proposed by the fisheries department. The State Government accepted these proposals and they were immediately giving effect to in the South Kanara and Malabar districts.

In order to augment the fish supply, the Fish Directorate of Government of West Bengal has started "Deep Sea Fishing" in the Bay of Bengal. This Scheme was launched and the exploitation and survey of Deep Sea Fishes started on 26th December, 1950. The objectives of Deep Sea Fishing are to—

1. Locate the best fishing grounds,
2. Determine the proper fishing seasons,
3. Ascertain the types of fish available—surface, midwater or bottom,
4. Decide the type of gear and craft most suitable for working in these waters at different levels, and
5. Arrange the training of Indian personnel for operating the vessels and gear.

There are 2 Danish Trawlers and 3 Japanese Bull-Trawlers under operation. They have located 12 potential fishing grounds and found that the period from November to March is the best season for fishing. It was also observed that the haddock trawl net gives the best results in quality and quantity of catch. A number of co-operative credit societies are also functioning. Now attention is concentrated on starting societies which would pool and sell the members' catches either as fresh or cured fish. Inspectors who have been specially trained to deal with fishermen and their problems have been appointed to organise and supervise the fishermen's co-operative societies. Bombay has followed the example of Madras in the matter of organising co-operative societies and in providing amenities for the fishermen. Efforts to induce fishermen to work in co-operation are made by the departmental officers in the Punjab, West Bengal, Andhra Pradesh, etc.

To wean fishermen from their indebtedness to capitalists, to improve the methods of preparation for the market and the marketing of fresh and cured fish, organization of multi-purpose societies among the fisher-folk supervised by fishery officers and linking them with sale societies in consuming areas seem very necessary.

(3) NOTE ON THE WORK OF F. A. O. FISH MARKETING EXPERTS

The Ministry of Food and Agriculture requested the F. A. O. of the United Nations for the assignment of Fish Marketing Specialists for advising the Government of India on plans for efficient distribution and marketing of fishery products, special attention being paid to the movement of fish from the many landing places to potential inland markets, to the factors hindering the expansion of fish trade and to the part to be played by co-operative societies in the improvement of fish marketing organisation and methods in India. The setting up of pilot projects to demonstrate the effective use of co-operative marketing methods was also envisaged as an important feature of the programme. Accordingly, F.A.O. assigned three experts, for varying periods between 1956 to 1959.

The following were the principal recommendations made by these experts. Detailed surveys of marketing conditions and systems should be taken up for developing the potential inland markets, a model sanitary code should be prepared by the Government of India for observance in the fish markets, supervision of marketing practices in important cities like Bombay, Madras etc., should be introduced, separate fish markets should be set up wherever feasible, fish should be sold by weight and the metric system introduced at present in certain parts of the country should be extended to the fish trade, removal of certain administrative handicaps in Nagpur and Madras cities for movement of fish should be removed, experiments to evolve improved types of containers for transporting fish by trucks, bicycles and railways should be conducted, certain order of preference should be followed in the erection of ice and cold storage plants, quality standards should be prescribed for important varieties of fish and fishery products for export purposes, ways and means should be found to reduce the cost of services to a level which would encourage the co-operative societies to take up fish business on commercial lines and the various pilot fish marketing schemes should be integrated with the activities of the Fishermen's Co-operative Societies.

B—Fish Sub-Committee's recommendations and action taken on them

The Fish Sub-Committee of Policy Committee No. 5 on Agriculture Forestry and Fisheries had made several recommendations (1945) suggesting measures for increasing production of fish and for reforms in all branches of the fishing industry. Some of these have already been referred to in the foregoing pages. The main recommendations are summarised below :—

The sub-committee after a careful review of the present position of the fisheries and fish trade came to the conclusion that material increase in fish production or development of the extensive and varied fishery resources of the country would be possible only if a comprehensive programme based on an All-India policy of survey of fishery areas, initiation and co-ordination of research, conservation, development and exploitation of fisheries improving the socio-economic condition of the fishermen, providing more efficient and modern crafts and tackle and

organising the fish trade on proper lines is adopted. For placing the very important but neglected fish industry of India on a firm footing and developing it, the Sub-committee recommended that the Government of India should provide the necessary funds, staff and machinery for affording both direct and indirect assistance and urge that the Central Organisation be set up without delay.

The Sub-Committee concluded that development of marine fisheries would be possible only through the location of suitable fishing grounds by detailed surveys and research, assessing the suitability of different types of fishing craft and tackle to Indian conditions through experimental work and provision of proper transport and harbour facilities.

Regarding inland fisheries the Sub-Committee drew attention to the urgent necessity of conserving and increasing the fish population of rivers and streams by stocking, development of suitable techniques, conservation, eradication of pests, water hyacinth etc.

Other recommendations include the bettering of the economic condition of the fishermen by removing the various handicaps and providing facilities for fishing operations; organisation of co-operative sales societies; bulk purchase and sale at controlled rates of various articles such as timber, sail-cloth, coal-tar, fishing hooks, yarn etc. required by fishermen; a special survey to ascertain the minimum number of ice-factories required for each fishing area; removing the defects in the existing methods of curing fish; supply of sufficient quantity of salt and as pure a quality as possible at cheap rates; and improving the methods of extraction of shark liver oil and preparation of concentrates of shark liver oil.

The Fisheries Development Adviser to the Government of India has been helping various States to draw up schemes for the development of fisheries, increasing production in their respective areas and other allied fisheries matters. In addition to providing technical advice the Central Government have agreed to give necessary financial assistance for all suitable development schemes.

During September, 1948, a Conference of fishery experts of States was held to review the progress made. This Conference largely endorsed the recommendations made by the Fish Sub-Committee. Details regarding co-ordinated procedures for collecting statistics carrying out *ad hoc* pilot and detailed investigations of fishery potentialities of different areas, dissemination of results of investigations, technical information etc. were finalised at this conference. In 1956 another Fisheries Conference was held at Madras in which all aspects of Fisheries development were discussed.

C—Pisci-culture

In India every village has got one or more tanks. Agricultural operations in areas which receive a seasonal rainfall are conducted with water stored in irrigation wells. The perennial tanks and wells, with

care and attention and application of right methods are capable of providing an unfailing supply of good fish. Production of fish for food is the main aim of fish-culture in our country, though some of the cultivated species of fishes subserve the purpose of sport as well. Fish culture in India has been an ancient industry mainly in the States of West Bengal, Bihar and Orissa where every year people stock their ponds with fish fry collected from rivers. Concerted efforts are now being made by the Government in almost every State in India to popularise fish-culture. Enhanced production of fish and its supply in prime condition on a basis of regional self-sufficiency are the main objectives of inland fisheries development in India. Every piece of water, whether seasonal or perennial has a natural fish population in it and yields an annual wild fish crop which is usually very meagre. By adopting certain simple scientific methods of cultivation fish production from all such waters can be increased several fold. Though an ancient industry, the fish cultural practices followed in India are, in most cases without scientific background. The methods are often wasteful and faulty, thus seriously limiting production and returns. To many, fish culture till consists of purchasing a cupful of fry from the dealer, releasing them in pond and reaping a harvest of whatever remains at the end of the year. Recent researches carried out in the country however, demonstrated that fish production could be materially augmented by judicious application of the results of researches in the field. Fish can be "cultivated" just as vegetables are grown in a kitchen garden. In many parts of Central Europe, America and Japan, Fish culture in ponds and tanks is a part of the agricultural practice.

In Pisciculture, the tank is selected and "prepared" and fry of suitable varieties that grow quickly are planted in it. The preparation consists in removing predaceous fishes, silt, decaying organic matter and coarse vegetation. Regarding fry, carps are universally liked and there are several edible varieties indigenous to this country. There are also the exotic Java Fish Gaurami, the Pearl Spot, freshwater mullet, etc. of which the fry can be obtained in India at a low cost. In Madras they are charged for: Catla fingerlings cost Rs. 5 per 100, gaurami Rs. 10 per dozen and other varieties from Rs. 4 to Rs. 5 per 100. The fry has to be transported in suitable aerated containers. There is a large trade in fish fry and fingerlings, in West Bengal and Bihar.

In the words of Sir F. A. Nicholson "In India an acre of average water will, with proper care, produce as great a weight of food as an acre of average land, while its money value will be much greater. The utilization of ponds by pisciculture not only costs less than arable cultures, but is far less liable to seasonable uncertainties, while the water is still available for other purposes and is even improved by fish growth. The stocking should necessarily be accompanied by a carefully planned fish-ing programme so as to spread the supplies over the whole year round".

Irrigated and flooded fields can be used for growing fish. The operations conducted in Japan can be given as an example. Carp fingerlings are introduced into the irrigated rice fields and they are found

to grow to a marketable size by the time the crop is ready for harvesting *i.e.* in four months. On account of the warmth and richness of planktonic life, the growth of fish in shallow water fisheries is rapid and within a few months they attain a size of a foot to 18 inches which normally would require two years to attain in an average perennial tank. The fish does not injure the crop; on the other hand, it helps the cultivator in destroying the insect pests. In India, it is in the irrigated or flooded locations that the fry most abound and generally during the monsoon rains every little stream and piece of water is resorted to by them to obtain food in. In the fields which are divided off into embanked spaces in order to distribute the water, the fry obtain an entrance along with the water which is fortunately at a depth to suit their puny size. Food is abundant and except birds there are but few natural enemies for the fry to contend with. The water is conducted from field to field but the arrangement instead of providing an excellent nursery for the young to develop has been ignorantly used by men to place traps at every outlet and destroy all the young fish as they drop downwards. With intelligent propaganda and no extra expenditure, the rice fields may be made to yield literally a "double crop". The Madras State Fisheries is conducting experiments on "Paddy-cum-Pisci-culture."

Fish-culture has one other advantage. From confined waters small fishes of most varieties destroy mosquito larvae and thus help to keep down the menace of malaria and other water born diseases. Special larvae devouring fish such as *Haplochilus*, *Panchax*, *Chela* and *Barbus* are supplied by the fish farms in Madras and Punjab for stocking waters in malaria infected areas. Realizing that there is an enormous possibility of increased production of fish by intensifying pisci-culture of the perennial and semi-perennial tanks found scattered in all parts of the country, and the numerous creeks, back-waters and lagoons, the Ministry of Food and Agriculture, Government of India, have instructed States to give priority to cultural operations, in confined waters in the drive for production of more food. While supplies of carp fry are available in West Bengal, Bihar, Orissa, Uttar Pradesh, Punjab and Delhi, further prospecting is necessary to locate the spawning grounds of carps to meet the increasing demand of these States as well as for export to deficit areas and due attention is now being paid to this.

In recent years much attention is being paid to collection of fry and stocking them in inland waters in many States. In Bombay State 350 lakhs of fry were collected in the year 1955-56 in addition to which 10 lakh were imported from West Bengal. In Madhya Pradesh 30 lakhs of fry are collected annually. In Madras State 190 lakhs of fry were collected in the year 1955-56. In Orissa State 10.2 lakh were collected of which 9.48 lakh were sold to private pisci-culturists, the rate per 1,000 varying from Rs. 5 to Rs. 25. In Bihar State 69 lakhs of fry were collected in the year 1956 and 2,300 additional acres were brought under fish culture. In Uttar Pradesh 202 lakhs of fry were collected in the year 1955-56.

Rural pisci-cultural schemes are now in operation in all States under National Extension Service and Community Development Blocks. Tanks, ponds and other confined waters are systematically surveyed and fry or fingerlings of carps obtained from local fry collection centres or by import from an adjacent State are placed in them. The work is being intensified in pursuance of the resolutions passed at the Fisheries Conference held in Madras during 1956, to the effect that "(i) all cultural waters are to be devoted to pisci-culture necessary repairs being affected to tanks not in first class condition with the help of subsidies given by Central and State Governments ; (ii) establishment of more fry collection centres and if necessary subsidised distribution of fry; (iii) controlling fishing by legislation".

D—Propaganda

A very important method of publicity and of education in fishery methods is by means of exhibits at fairs, aquaria and museums. The Fish Seed Syndicate Ltd. Calcutta sponsored by the Government of India's Fishery Extension Unit has been organised with 12 to 14 members, consisting of spawn collectors, nursery owners, fish traders and net makers for the supply of carp spawn, fry and fingerlings, fishing nets and other equipments to the State Government Departments and Private fish farmers. The qualities and rates of articles offered by the syndicate are approved and checked by the Chief Research Officer and fisheries Extension Officer of the Central Fisheries and the latter works as the Honorary Adviser to the Syndicate. The Syndicate has been made to agree to supply fish seed at a much cheaper price than the prevailing market rate and the price of mixed carp fry up to 1" size has been fixed at Rs. 8 per thousand together with a free supply of 10 per cent free mortality allowance.

The fish seed supplies made by the Fish Seed Syndicate to various States in India or outside during the year 1950—1958 are given below :—

Years	Fry & Fingerlings in lakhs	Number of Kunka (at least 2 lakhs Spawn per Kunka)
1950.	10·16	Nil
1951.	27·12	14
1952.	35·40	24
1953.	52·90	21
1954.	53·80	26
1955.	72·30	21½
1956.	87·17	16
1957.	112·04	..
1958.	164·89	6

Fish seed is transported by rail and road in open earthen containers but a considerable amount is also sent by air in specially prepared tin containers with oxygen. The containers have been replaced

recently by plastic bags and cartons after repeated experiments, and more than 2000 plastic bags are now being sent annually. Poly pack poly thin bags similar to those of plastic bags are now being used because of their being comparatively cheaper. The dimensions of these bags are 27" x 9" x 9" guesstimated in such a way as to fit in exactly the tin for easy packing and transport. One bag and a tin is charged by the syndicate at Rs. 3 per set.

Some maritime States are organising exhibitions periodically. In these exhibitions charts and pictures depicting "Grow More Fish", "Fish for Food and Profit" etc. are also displayed. Live and preserved species of commercially important varieties of fish are shown to the public in jars and glass aquarium. Models of improved types of craft and gear are also shown. To popularise consumption of fish the Madras State Fisheries even sell fish cutlets during the exhibitions.

Many States are publishing literature on the several aspects of fishery development and particular emphasis is being laid to fish farming. The Ministry of Food and Agriculture are publishing "Indian Journal of Fisheries" twice a year since 1954. The Fish Farmer's Calendar has been published recently. There are three aquaria in India one each in Madras, Bombay and in Trivandrum. Aquaria play an important part in making the public acquainted with the fisheries. In America, the Bureau of Fisheries makes use of a portable aquarium to educate the public about marine and freshwater food fishes, the hatching of eggs and pisci-cultural methods as well as in matters relating to fishing boats, appliances, specimens of buttons and other articles made from aquatic products. The aquarium is taken to different "expositions" all over the States. A portable aquarium would be extremely useful in India for educating people in the inland areas about the marine food fishes.

In recent years private fresh water "aquarium keeping" has become a hobby in many States notably Madras, Bombay and West Bengal. The common varieties found in home aquarium are gold fish platy, guppy sword tails, siamese fighters, molly, angels, neons etc. The price varies from a few Naye Paise to Rs. 10 a pair. Many of these varieties are bred and either exchanged with or sold to aquarists. Aquarists societies and association have also been organised for this purpose. Small trade have sprung up notably in West Bengal who sell young ones of several varieties mainly gold fish in lots of 100. Aquarium fish are easily transported by air in plastic bags. Some water and the fish are put in a bag and after infusing some oxygen into it, the mouth is closed and sealed. The whole bag is put in card board boxes and sent by air. Two such consignments were brought with very little casualty by the fresh water aquarium at Madras from Ceylon and Singapore. Museums are performing a very useful function and the wax casts of important food fishes in the Museums at Bombay, Calcutta and Madras are attracting a great number of visitors.

Other methods of propaganda are by organization in the fishing industry itself for the purpose of conducting extensive advertising and by Government publicity.

In this country, a number of fishes are little utilized to-day by urban consumers, either because of the unfounded prejudice against them or the ignorance of the consumers regarding their qualities. Many of these fishes e.g., sharks are excellent as food. Propaganda campaign to familiarise the public with the qualities of these fishes should be undertaken. Owing to the development of an indigenous medicinal shark liver oil industry in India, cartilaginous fishes are now caught in large numbers. Their flesh unfortunately is mostly wasted.

SUMMARY

Commercial fishes of India

In a country of the size of India with its extensive sea-board, perennial rivers and irrigation canals and innumerable rain-fed tanks and *jhils*, the physical and biological conditions under which fisheries exist are very varied.

Fish are caught where available from every piece of water. The chief sources of supply are the coastal margins of the sea, river estuaries and backwaters for marine and estuarine fish, and rivers, irrigation and other canals, tanks, inundated tracts, etc., for freshwater fish. India has a coastline of about 2,920 miles and the total area of the sea which lies between the coast of the 100 fathom line is approximately 110,000 square miles. Only a small portion of this extensive area is worked.

The estuarine and riverine fishing of this country are important as they already supply considerable quantities of fish in many inland areas. In India, only a few of the confined waters, e.g., tanks, lakes, *jhils*, etc. are devoted wholly or in part to fish culture (pisci-culture).

In a large sense, the word "Fish" includes not only the finny tribes but also crustaceans like prawns, lobsters and crabs, edible molluscs, e.g. oysters and clams, and pearl oysters, chanks and other shells. Pom-frets, seer, perches, certain types of jew fishes and mullets among sea fishes and rohu, catla and several varieties of cat-fishes caught from fresh water, are popular with the consumers. Among marine fishes sardine, mackerels, sharks and cat-fishes although not so well known are commercially important.

Fishing gear

In the sea, fishermen catch fish very near the shore and do not go beyond a distance of 5 to 7 miles. The crafts (canoes and catamarans) are small and undecked; they usually start in the morning and return in the evening and the practice of staying out for weeks or even for one day is not practicable. All large rivers, tanks, backwaters, and estuarine regions of rivers are intensively fished. As regards nets and other fishing implements these are such as would help the catch of particular fishes. Bag-nets, drift-nets, inshore drag-nets and long lines are used in marine fishing. For fishing in rivers, backwaters tanks etc. spears, traps, baited springs, harpoons and other similar ingenious devices are provided. Cast-nets are very commonly used while fishing in shallow waters.

Power fishing of Indian Seas has only been tried on an experimental basis on few occasions, in the past, but in recent years commercial exploitation along with survey of fishing grounds have been taken up in the States of Bombay, Kerala, Madras and West Bengal. The vessels of deep-sea Fishing Station Bombay have completed the charting of fishing grounds off the coasts of Bombay and Saurashtra

p. to 40 fathom line in addition to exploratory fishing and providing training in various power fishing methods. It is proposed to further extend the activities of the station and undertake charting of fishing grounds beyond 40 fathom line.

Supply

From the Statistics maintained by the Central Marine Fisheries Research Station, Mandapam, it has been possible to estimate the landings of marine fish in India. Inclusive of fish caught in estuaries and backwaters the total annual average production of marine fish is estimated at 671·9 thousand metric tons. It has been possible to estimate only the marketed surplus of freshwater fish, which amount to 80·8 thousand metric tons.

Bombay and Gujarat Coasts account for nearly 42·7 per cent ; Travancore and Cochin 16·8 per cent, Malabar and South Kanara 13·8 per cent and West Bengal and Orissa Coasts 1·4 per cent of the total sea fish landed. The West Coast of India accounts for 84·1 per cent while the East Coast for 15·6 per cent of the total landings of marine fishes in India.

Out of the total marine catch according to groups, Herrings and Anchovies constitute 22·3 per cent, crustaceans 19·3 per cent, Mackerels and Perches 18·2 per cent and Bombay Duck, 12·9 per cent. The other popular fishes like pomfrets, Indian Salmon, Mulletts and Elasmobranchs are caught only in small quantities. Regarding availability of fresh water fish the share of Bihar in the total catch is the highest being 20·6 per cent of the total marketed surplus of fresh water fish in India. Andhra Pradesh comes next with 20·2 per cent followed by Madras West Bengal and Orissa having 17·4, 15·9 and 12·8 per cent respectively.

Fishing goes on in the sea throughout the year except when the weather is squally during the monsoon. Rivers are generally not fished during the rains except in the State of West Bengal and Bihar. Tanks, *jhils*, lakes and other inland waters are fished with vigour during summer when the level of water is low. In general fish production is concentrated during the period—September to February—and is the lowest between May and July.

There has been a progressive increase in the marine fish landed from the years 1953 onwards. The supply of fresh water fishes have also gone up due to the developmental activities of the State fisheries departments. In certain areas, however, the fresh water fisheries have been depleted due to construction of dams and weirs, silting up of rivers, over fishing, destruction of immature fish and pollution.

Imports and Exports of fish-products

Imports of fish in fresh, chilled and frozen condition, from East Pakistan account for a considerable portion of the total imports into the country. The total imports showed an increase from 1952-53 to 1955-56

and thereafter there has been a gradual fall. Among the imported products, canned fish, cod liver oil and whale oil cost the country more than any other products.

Although exports fall under 12 items of fish-products, those of major importance are dried unsalted fish, dried salted fish and prawns (fresh, chilled, frozen, salted, dried or simply cooked). The total export value realised shows an upward trend till 1954-55 and in the subsequent years there is a slight fall but in 1957 it has almost touched the 1954-55 level with a further increase in 1958 when the exports reached their peak. Canned fish, fish maws and sharklins, other crustacea and molluscs and prawns had the highest export price per cwt. Ceylon has been the principal buyer taking more than two third of the total exports from India. Burma comes next with 20 per cent on an average.

Per capita consumption

The average annual *per capita* consumption of fish including products in respect of India as a whole is 4·97 lb., although actual consumption in different tracts varies widely. The highest consumption is observed in the maritime States of the West Coast. Kerala has the highest *per capita* consumption of 22·86 lb. Bombay is second in position having 13·92 lb. Among completely inland areas Bihar leads with a *per capita* consumption of 2·07 lb. followed by Delhi with 1·6 lbs. The consumption in the Punjab is the least being only 0·05 lb. per annum. The *per capita* consumption of Calcutta City is 12·7 lb. per annum while in area adjacent to the coastal districts of Mysore the *per capita* consumption is as high as 14·0 lb.

Utilization

Nearly 47·9 per cent of the total production is consumed as fresh fish, 23·2 per cent is sun-dried, 20·5 per cent is salted and 8·4 per cent is converted into fish manure. There are a number of varieties of fish caught from the sea which are little utilized as food, either because of unfounded prejudice against them or of the ignorance of the buying public regarding their quality. As a result these varieties have to be converted into industrial products like manure, guano, etc. instead of being consumed as food.

Preparation for the market

The marketed surplus of fish caught from rivers, tanks, and other inland resources is almost wholly consumed as fresh fish. The preparation of such fish for inland markets in most parts of the country consists in merely washing and packing in ice wherever available. Regarding sea-fisheries the position is different. The industry is scattered over a long coastline and fish supplies are irregular. The method of catching, the small size of boats and certain established customs hinder the adoption of steps which could keep fish free from taint during transit from the moment of catching to the shore. The boats have to stay for hours to get a sufficient catch during which time the fish heaped in them get trodden upon and are exposed to the full glare of the sun. Except the markets that are about 5 miles distant from the coast and

few interior areas to which fish is despatched with ice, the supply of fresh marine fish in India is not always fresh. With a view to improving the supplies of fresh fish in the markets in the interior, a programme for the construction of fish freezing plants in the coastal areas and cold storage for keeping frozen fish both in the coastal areas and in the consuming markets is now under operation. Cold storage plants for which have already been installed in the States of Bombay, Madras, Orissa, Kerala, Andhra Pradesh and Mysore. The bulk of the sea fish are sun-dried or cured with salt and at present reach the inland consumers in this form. When the salt was an excisable commodity, the Government of India used to allow salt free of duty for curing fish under certain conditions. The duty on salt was removed *w.e.f.* 1st April, 1947. Since then salt had become expensive due to the cost of production and increased transport charges and fishermen, therefore, diverted to private curing yards and cured the fish with Bazar salt under unsuitable conditions. In order to induce fishermen to resort to curing in the Government yards the Government of India have been giving subsidy at the rate of 50 per cent of the net cost under the "Grow More Food Scheme". The fish curing yards are located mostly in the maritime States.

Prices

Fish prices rule high in urban markets, but facilities for getting fresh fish where these are in demand from distant producing centres are yet comparatively undeveloped. In most areas local conditions alone determine the price. Fishermen get a lower price for fish sold for manufacturing purposes and a higher price for fish sold for consumption as fresh fish. Certain marine varieties, *e.g.*, promfret, seer, bekti and arps and live-fishes caught from fresh-water are prized by consumers and fetch higher prices than other economic varieties regarded as somewhat coarse.

Assembling, storage, transportation and distribution

The marketable surplus of fish is disposed of by the fisher people in either by themselves taking it to the nearest market or assembling centre and (ii) by selling at landing ghats to intermediaries who take it to the assembling centres. These intermediaries include agents of middlemen, boat-owners and curers, village merchants and itinerant dealers. Owing to the perishable nature of the commodity, transit from producer direct to the consumers is possible only when the market is within a distance of about 10 miles from the producing centre. The fisher people play only a small part in the actual distribution of fish as their financial obligations leave them little choice for disposing of their catches except to the creditors.

Co-operative Societies play only a very minor part in the marketing of fresh and cured fish. The fishery officials in States are now engaged in organising Fishermen's Co-operatives for the catching, pooling, preserving and the marketing of both fresh and preserved fish. Some progress in this direction has been made in Bombay, Madras, West Bengal and Orissa States.

Many villages and towns have fish markets where fish are assembled and sold, but this often consists of an open space only. In certain cities, the Railway premises serve as a market place for fish arriving by rail. There are stalls for retail sale of fish in the municipal and cantonment markets in most of the cities. In the principal towns and cities in Northern India, *Adatya's mandis* serve as wholesale fish markets for freshwater fish.

Fish and fish-products are highly perishable; attempts are, therefore, made to dispose of stocks as quickly as possible even at a smaller margin of profit. Usually fresh fish is not stored in any consuming centre for more than 48 hours except in places like Calcutta, Bombay and Madras etc. where cold storage facility is available. Only in certain parts of West Bengal and Assam are dried fish stored for use during the time when fresh fish is not available. In other parts of the country 2 to 3 weeks is the carry over period during which preserved fish reach the consumers.

The means of transport employed in the marketing of fish are head-loads, shoulder slings, pack-animals, bullock-carts, boats and pony-cars. Motor-lorries and rail facilities are used wherever available. Bicycles being cheap and speedy are quite popular. The transport actually used varies from tract to tract and depends upon local custom, the quantity, and type of fish to be handled and the distance which has to be travelled. Fish carried by rail is charged for at half parcel rate. Special facilities for transport of fish seed have been provided on railways.

Fish fry and spawn packed in plastic bags with oxygen are also being transported by air from Calcutta to certain areas for stocking purpose. Baskets, gunny bags, wooden cases and earthen pots are used as containers for fresh fish and coconut, palmyrah and screw-pine leaf-mats for packing preserved fish.

Fishermen in most parts of the country are indebted to the middlemen and are practically at their mercy.

The producer's share in the consumer's price is high when fish is sold for consumption in the producing area. It is lowest, being about 40 to 45 per cent when the fish is sold in retail at distant markets.

Reorganisation of fisheries research

The development of fisheries resources of India engaged the attention of the Government of India for a number of years during the last century and resulted in the passing of the Indian Fisheries Act (Act IV of 1897) and the grant of the concession of duty free salt for curing fish. The Government of India began taking an active and direct interest in the development of fisheries in 1944. A Fish Sub-Committee was appointed to review the position of fisheries in the country and to recommend measures necessary for their development. The recommendations of the Committee received immediate attention and as a first step, some technical staff were appointed at the centre to carry out a rapid survey

and help the State Governments in formulating and implementing the schemes relating to fisheries development with financial assistance from the Central Government. The subject of fisheries was at that time the sole responsibility of the Provincial (now State) Governments. Under the present constitution of India, the Union Government have however, assumed direct responsibility for fishing and fisheries in extra-territorial waters and for fisheries research.

The Central and the State Governments have been taking progressive steps for increasing fish-production by developing the extensive and varied fish resources and have also charted a comprehensive programme based on all India Policy of survey of fishery areas, initiation and co-ordination of research, conservation, development and exploitation of fisheries. Measures have already been taken to improve the socio-economic conditions of the fishermen in certain areas, by providing them with more efficient crafts and tackle and organising fish trade on proper lines.

All large scale programmes for the development of fisheries have necessarily to be based on the solid foundation of scientific research and experiments. The Central Government have established two Fisheries Research Stations one for research on problems connected with marine fisheries and the other for those connected with fresh and brackish water fisheries.

The research stations are located at Bombay, Karwar, Kozhikode (Calicut) Cochin, Madras and Mandapam for marine fisheries and Calcutta, Cuttack and Allahabad for inland fisheries.

The fisheries research work, mostly on problems of local importance, is also being done in a number of States. In addition, the Indian Council of Agricultural Research is sponsoring fisheries research by financing *ad-hoc* schemes of State Governments and Universities.

An *ad-hoc* Fisheries Research Committee was set up by the Central Government in 1954 to review the work of the Central Fisheries Research Stations and to plan their future programme, after taking into account the work done in States and Universities. Expansion of the research programme of the central stations has been planned on the basis of the recommendations of this committee. A Standing Fisheries Research Committee has also been set up to co-ordinate research on fisheries carried on by the Central Fisheries Research Stations, Fisheries Departments of the State Governments and the Universities.

RECOMMENDATIONS

Several problems pertaining to the Development and Marketing of Fish and fishery products have been discussed in the All-India Fisheries Conference held in 1956 and Conferences of State Ministers for Fisheries held in 1957 and 1958. The recommendations made in these Conferences pertaining to (i) setting up of independent departments for fisheries development, (ii) use of nylon as well as Italian hemp twine for the manufacture of nets, (iii) mechanisation of indigenous fishing crafts, (iv) need for reliable All-India Fisheries Statistics, (v) organisation of fisheries co-operatives, (vi) establishment of separate fish markets or separate portions of general markets, (vii) providing facilities in the transport of fish by railways and (viii) need for developing suitable packaging for fresh fish have already been given on pages 1, 19, 24, 27, 100, 110, 116 and 117 of this report. In addition to these, other recommendations made in the Conferences of State Ministers for Fisheries held in 1957 and 1958 pertaining to marine fishing industry, inland fisheries and extension are being reproduced below :—

Marine Fishing Industry

The Conference is of opinion that formation of fishing companies in the private sector for the composite purpose of catching, handling, processing and distribution of fish and manufacture of fishing requisites will be useful and substantial contribution to the development of fishing industry and that the Central and State Governments should generally help the establishment of such Indian fishing organisations. It was likewise felt that to enable existing industrial ventures in fisheries to carry out fishing and ancillary operations efficiently the present rather irksome laws in respect of the operation of the vessels, customs formalities etc. should be suitably revised. As far as possible better transportation facilities should be extended taking into consideration the special requirements of fish trade and marketing and this may be by improved feeder roads between the major production and consumption centres or the rail heads, refrigerated road transport, railway wagons for fish in the major routes, installation of cold storage and ice making plants in the interior and at centres of production. The conference feels that steps should be taken to secure more advantageous terms in shipping freight which is so essential if the frozen shrimp and fish trade is to develop. The need for observing high standards of quality of the export product was stressed and it was recommended that suitable action may be taken to ensure that only high quality product is exported. Close liaison should be maintained between the industry and the developments in scientific and technological research.

Development of deep sea fishing and connected activities should not be prejudicial to the interests of fishermen and the existing indigenous industry. The Conference recommends that help should be extended to fishermen's co-operatives on the same scale as is envisaged for

private industry in instances where such help would be adequately utilised. In order to assure a healthy development of the existing fishing activities attention might be paid in the initial stages to the industrial organisation of assembling, storage, processing and distribution of fish now being caught by indigenous methods a good example of which is the prawn freezing industry. There is considerable scope in the private sector for the development of fish processing industry based on existing catches.

The Conference recognises that fishing in the high seas around India should be developed in a national scale and welcomes the initial steps taken by the Government to carry out exploratory fishing. The attention of private industrial interests is particularly invited to this so that fishing companies for large scale fishing and the connected industries might be formed. As foreign exchange will not be available for some time, Indian investors should secure the participation of foreign capital whereby the fishing vessel and other major items of capital equipment will be provided by foreign participants who may be drawn from countries with well established fishing industry. In many aspects of high seas fishing and organisation of connected industries, technical experience of the country is insufficient and the success of joint commercial ventures largely depends on technical help and assistance which the foreign participants would provide.

The Conference recognises that harbour and docking facilities for fishing vessels are essential to the success of such industries and requests the Central and State Governments to take special steps for the provision of these facilities.

The Conference feels that there is considerable scope of increasing fish production and promotion of exports. In this connection, full use should be made of foreign collaboration.

Inland fisheries

The Conference having considered in detail the various aspects connected with inland fishery surveys and fish production recommends as follows :—

- (1) For obtaining statistical information, uniform proformae should be prescribed and circulated by the Central Inland Fisheries Research Station.
- (2) For evolving suitable sampling methods for collection of catch statistics, surveys should be undertaken both by the Central and State Departments of Fisheries.
- (3) The Central Fisheries Training Course might include fisheries survey as one of the subjects in its curriculum.
- (4) Staff meant exclusively for conducting inland fishery surveys should be provided in all State Departments of Fisheries.
- (5) Every State should make an effort for the collection of fish spawn and fry in their own State.

- (6) Suitable model legislation for conservation of fisheries in natural waters and protection to brood fish may be prepared by the Central Government and circulated to all State Governments for adoption.
- (7) The Airways and the Railway Board should be moved to provide all facilities including concessional rates for quick transport of fish spawn and fry during the season between May and September in the different regions by the Ministry of Food and Agriculture. The programme for each year may be planned two months preceding the season in consultation with the State Fishery Departments.
- (8) In States where there are swampy areas, efforts should be made to reclaim such swamp for the purpose of fishery development.
- (9) In developing reservoir fisheries of States, attention should be paid to settling refugee fishermen from East Bengal and as a first step the State Governments may examine the potential areas and the number of fishermen families who may thus be settled.
- (10) An Expert Committee should be constituted to evolve and suggest suitable method of measuring the progress of various inland fisheries schemes. This Committee should arrange for type studies being carried out to assess fisheries development in small selected areas and suggest a suitable standard method within a period of one year for adoption by the various States. The Committee may consist of the following with powers to co-operate with others, if necessary :—
 - (1) One representative of the Central Government.
 - (2) One representative from the State Government in which type studies are to be carried out.

Extension

Having considered the need for employing improved techniques for fish culture, fishery management and other field practices and for popularising fish farming and conservation of inland fisheries, greater stress should be laid by the Centre as well as the State Governments on fishery extension activities especially in the Community Development Blocks. In this connection it may be noted that Fishery Extension Units have been set up by the Ministry of Food and Agriculture on a regional basis and by some of the State Fisheries Departments.

In order to intensify inland fishery development in Rural areas, extension work should be undertaken in selected Blocks. Each State should undertake on a pilot basis, with the help of suitably qualified staff, intensive fishery development in 2–5 selected Blocks, in the first instance, as a part of their fisheries developments programme, so that the experience gained may be helpful in drawing up the extension programmes in the remaining Blocks.

Intensive fishery development programme in the Blocks should include training of Extension Officers, VLWs, Village Leaders, Survey of cultivable waters, establishment of nurseries, improvement of ponds, intensive stocking, exploitation of developed waters, marketing and rehabilitation of fishermen. In selecting the Blocks the availability of suitable water areas, fish seed, facilities for marketing and existence of fishermen communities should be taken into consideration.

The Conference stressed the need for early implementation of the recommendations made at the Annual Conference on Community Development held recently at Mount Abu, and in particular, the following :—

1. Detailed survey of waters suitable for fish culture should be undertaken in each project area.
2. Improvement of suitable waters for purposes of fish culture by bunding and desilting should be undertaken. For this purpose, people's participation locally should be enlisted as far as possible.
3. A Fisheries Extension Officer should be appointed in each intensive development area, so that maximum use of culturable waters may be made. He should also be responsible for organising fisheries training for V.L.Ws.
4. Sufficient seed should be supplied for stocking culturable waters.
5. The staff of the Departments handling fisheries development work should be trained, particularly.

APPENDIX I

Commercially important fishes with their scientific, popular and the more common Indian names
(i) Sea fishes

Name of fish	Popular name	Bengali	Canarese	Malayalam	Marathi	Tamil	Telugu	Special names in certain regions. (The name of the locality is given within brackets).
1	2	3	4	5	6	7	8	9
<i>Carcharinus gangeticus</i>	Ground shark of the rivers.	Hangat	Bugga karuvai, Baliai, Tamasi	Voliya sravu	Waghsheet	Murdansora	Sorra	
<i>Galeocerdo rayneri</i>	Skark	..	Pil-thatte.	Pullian sravu	..	Valuvansora	Kattalum	
<i>Sphyrna blochii</i>	Hammer-headed shark.	Julia, Magar	Keblchatte	Kannankodi	Zori Kanere	Komban sora	Soppa sorra Kama sorra.	
<i>Pristis cuspidatus</i>	Saw fish	Khanda manur	Chakku-thatte	Valu sravu. Makara sravu	Kandero	Velamin, illupa.	Yahla, Hathuthi meenu,	
<i>Phynobatus djeddensis</i>	Skate	..	Etti-balliar	Varithalai	Ranja	Kachuluwai,	Walawah Tankee, Nulalavi.	Lang (Pombay). Fadka (N. Kanara)
<i>Dasyatis sephen</i>	Sting ray	Shankush	Kottai thorake	Kottivalan, Padayan the-randi.	Goval pakat Palwa,	Attuvalan tirukkai,	Belugiri Tenku.	Ambala-Sindhi.
<i>Muraenesox talabonoides</i>	Fel	Bam	..	Pambn-meen	Wam, Balc	Vilangu, Kuzhippambu, Kotah.	..	
<i>Tachyurus dussumieri</i>	Cat-fish	..	Mogam shete	Valia-etta Conan etta.	Shingala	Mandai Keleru	Jedi Jolla.	
<i>Tachyurus tota</i>	Do.	..	Shede	Do.	Do.	Keluthi	Jellalu	Khogo-Sindhi.
<i>Chirocentrus dorab</i>	Silver-ear fish	Khanda	Karli	Mulla-Vala	Karli, Datali	Mulluvalai	Mulluvalava	
<i>Sardinella longiceps</i>	Oil sardine	..	Baige	Nalla-mathi	Haid-Torli	Paichalai, Nallalai.	Noona Kavallu.	Buhai (Kanara). (S.)
<i>Sardinella fimbriata</i>	Sardine	Khaira	Pedi, Fiehai	Chala-mathi, Cutkay charlay	Pedwa, Washi	Sudai	Do.	Charce-addee (Hindi).
<i>Hilsa ilisha</i>	Hilsa fish	Hilsa	Paliye	Paluvay	Pala	Ullam	Palasah	

Thrisocloes purava	Anchovy	Phansa Tel Tumpri.	Manangu	Kati	Poruva Net-hal	Poravallu	Pusai (Oriya).
Engraulis telara	Gangetic anchovy.	..	Do.	Do.	..	Engallu	Tampara (Oriya).
Harpodon nehereus	Bombay Duck	Nehare, Lotis	..	Bombil, Bummil.	Vangaravasi	Vanamattlu.	..
Rastrelliger Kanagurta	Indian mackerel	..	Bangada	Kaula gedar	Kumla, kanangaithi.	Kamangodachalu.	..
Scomberomorus gottatus	Seer	Bijram	Khulkul, Aukulai, Jhavar.	Towar	Vanjiram, Secla.	Vanjiramu	..
Scomberomorus commersonii	Do.	Champa	Arkulai	Tuvar anajari	Mavulasi	Konema Yellari.	Kirgan-Sindhi.
Lates calenifier	B.etti, Cockup	Begti	Koliji	Filadar, Khajura Guri.	Koduva, Pameemeeen.	Pandu-chapa, Dadhara.	..
Trichiurus haumela	Ribbon fish	Rupa patia	Pambole	Pitirkti Bala Wagti.	Savalai	Savallu.	..
Catanz erumenophthalmus	Horse mackerel	..	Thiriyanda. Paraci.	Labi	Parai Vangadai.	Pura.	..
Leiognathus & Gazza spp.	"Silver belly"	..	Kanaikurichi	Katali Titaka.	Karal	Karalu	Tunka-chandes (Oriya).
Chordopilus Chinensis	Promfret	Chanda	Manji, Thondrette, chandretya (Black).	Chandava, Halwa (Black).	Vavval	Chandura	Saranga (Bombay) Bahal (Oriya).
Cynoglossus Pseudohomabas Spp.	Flat-fish "So'e"	Kukurijbh, Kantal Patta.	Nangu	Rhepti, Shivra.	Aral	Jerree-Potoo	..
Mugil speigleri	Grey mullet	*Bhangon	Shevta, Pare	Mangin hoir	Authumee, Manulalai, Madavai	Bonthalu, Kanisalu.	Maini (S. Kanara) Nakora (Oriya).
Eleutheronema tetradactylus	Indian salmon	Guchhia, Sahal	Vameenu	"Rawas" Cheluchi.	Pozhakkala	Maga.	..
Polynemus paradisius	Tapsi, Mango-fish.	Tupsee machh	..	Dodywa rawas	..	..	..
Otolithus Pseudoscena Johnius Spp.	Jew-fish	Poa, Poma	Balde	"Ghol"	Kathalai	Gorasalu, Gorakalu.	..
Prawns	Prawns	Chingri	Segadichotla Etti.	..	Yera	Royysalu.	..
Crabs	Crabs	Kankara	Aedi	Khakra	Nandu	Pitha	Kankada (Oriya).

* A kind of carp called "Bhangon" in the Punjab.

APPENDIX I—contd.

Commercially important fishes with their scientific, popular and the more common Indian names

(ii) Freshwater fishes

Name of fish	Popular names (English)	Assamese	Bengali	Hindi	Marathi	Oriya	Punjabi	Tamil	Teleugu	Special names in certain regions. (The name of the locality is given within brackets).
1	2	3	4	5	6	7	8	9	10	11
<i>Anguilla bengalensis</i>	Eel	..	..	..	Ahir	..	..	Scrampambu vellango.	..	Salais (Chitagong).
Wallago attu	Fresh water shark	Poil, Barali	Boyali, Keyali.	Boalee, Parhin, Lanchi.	Shivada, Pari, Purram	..	Mulley	Valai, Tele.	Wallagah	Sareng Painda Pattan Vala, (Malabar).
<i>Bagarius Bagarius</i>	Fresh water shark	Baghmachh, Goreah	Baghari	Boonch, Goonch	Mutanda, Tharota	..	..	..	Rahijellah	Vaghair Kheerd (Poona).
<i>Pangasius Pangasius</i>	Pungas cat-fish	..	Pungwas, Pungas.	Pariasi	..	Jellum	..	Kovail Oola- keluthai, kitchan	..	Pangsa (Nathpur).
<i>Silonia Silondia</i>	Silond cat-fish	..	Silun, Dhain	Baikar, Banspati	..	Ji-lung	Silond	Ponatti	Wanjou	Silondia Vacha (Cal- cutta).
<i>Mystus seenghala</i>	Air-cat-fish	Air, Auri	Air-Aor	Ari, Pogal	Singala, Singhata	Alli, addi	Chaija, Shingoa, Singharee	Cumboo- Keluti	Multi-jellah Seengala	Tengra, Tengen (Uttar Pradesh.)
<i>Netepterus chitala</i>	Featherback	Sectul, kandla.	Chital	Mohi	..	Chitul, pulli	Pari, But, Moh.	Ambutanwah- lah, Sethak- endai.	..	Chappal mache (Hy- derabad Dn.) Wal- laktuttah (Mysore).
<i>Etioplus, suratensis</i>	Pearl spot	..	..	Pitui-kas	..	Cundahla	..	Karsar, Uduppatti	Cashimara Dawana chapa	Karimeen, Pallathi (West (o- t).
<i>Liza corula</i>	Mullet	Keski	Elanga, Arwuti, Ingelee	Undala, Andwari.	..	Kakunda	Hurdwahre	..	..	Malan (Malabar).
<i>Channa striatus</i>	Snake-headed fish	Shaul, Gohal	Shol	Murrul, Sowra, Dherimur	Dakhu	Sola	Dhoalee, Carrodah	Veralu, Carrupu- veralu	Sowarth	Koochina-Murl (Kamara) Wrahl (Malabar).

Anabas testudinus	Common petch	Rohit, Rui	Ruee	Rohu	Tambada- massa	Ruhu	Pohu, Tapra, Dhanbra	Kendal, Sennal		
Labeo rohita	Rohu			Rohu	Tambada- massa	Ruhu	Pohu, Tapra, Dhanbra	..	..	Dai (Kutch) Rohu.
Labeo calbasu	Kanoshi	Mahlee, Kaliara.	Kalabasu, Kunda	..	Kanoshi	Kala-Betase	Dhai, Kalabasu, D.	..	Nalla- gandu	(Hderabad Deccan) Kuri-Meenu (Ka- nara). Tambra (Kutch).
Catla catla	Catla	Bau, Dhekera	Catla	Chepti, Catla, Boassa.	..	Bhakura	Theila, Theil.	Theppuncnu	Botchee	
Cirrhina Mirgala	Hamilton's Crap	Mirka, Mirga.	Mirgala	Naini, Mirgala	Mirgha	Mirgali	Mori Morakha, Naraini	..	..	
Tor tor	Mahaveer	Bura Patla junga Peetina.	Putitor	Naharm	Khadehi Masla, Mahsala	Kajja	..	Kendi Bonin	Pedha Pulika	Halla-minu Meruval- sore (Malayalam).
Prawns	Prawns	Chingri	Golda- chingri Moelia chingri.	..	..	..	..	Yera	Royyalu	Gingali (Dec- can). Konjan (Cochin).
Crabs	Crab	..	Patkangkra	..	Kekka	Kankada	..	Nandu	Pitha	

APPENDIX II

Statement showing the details of chank fishery in Madras State

Season	Number of Chanks fished		Purchase price of each full-sized chank (Naya Paisa)	Selling price		No. of canoes participated	No. of divers registered.	No. of working days
	Full-sized	Under-sized		Under-sized (Rs. per thousand)	Full-sized (Rs. per thousand)			
1939—40	5,39,662	7,987	·06	Rs. 58,224	Rs. 255 00	24	167	134
1940—41	4,36,625	13,509	·06	47,882	215 00	30	194	134
1941—42	4,95,403	20,377	·08	46,113	255 00	24	183	131
1942—43	4,58,894	29,918	·08	46,121	300 00	19	168	97
1943—44	4,30,274	24,500	·09	29,541	561 00	19	193	128
1944—45	2,68,380	13,664	·11	21,033	826 00	17	146	69
1945—46	4,76,302	13,598	·06	19,622	1,031 00	19	183	127
1946—47 (Strike)	665	475	·12	120	937 00	19	180	6

1948—49	5,99,103	39,783	28,308	.34	1,026	25	96	00	48	492	127
1949—50	10,34,677	56,826	30,225	.34	1,026	25	96	00	48	492	127
1950—51	9,83,815	63,345	30,831	.36	1,076	00	96	00	52	633	112
1951—52	6,81,006	42,025	19,189	.36	1,131	00	111	00	49	472	117
1952—53	9,44,666	64,380	38,843	.36	1,187	00	101	00	52	612	128
1953—54	9,00,431	83,797	61,438	.37	1,327	00	111	00	58	644	137
1954—55	3,46,680	28,305	9,984	.37	1,576	00	111	00	62	665	61
1955—56	..	..	16,838	.37	..	..	..	..	58	645	121
1956—57	6,60,800	35,039	27,371	.44	..	..	..	..	..	..	..

Source—Deptt. of Fisheries, Madras.

APPENDIX III

*The chief fishing implements used in the different fishing areas in India
(The Indian names current in the various localities are given)*

Marine and Back-water Fisheries														Riverine and Lacustrine.	
Type of fishing implements.	Gujarat area	Konkan area	North Kanara area	South Kanara area	Malabar Coast area	South Kanara and Malabar (back-waters).	Gulf of Mannar area	Coromandel coast area	Coromandel coast back-waters	Telugu area	Deltaic area	Ganga system of rivers etc.	Indus system of rivers etc.		
I	2	3	4	5	6	7	8	9	10	11	12	13	14		
I. Fixed or Stationary nets.	Jadi jal Magh	Waghur (budichi) Asu Kavi. Dol.	Zangad Wagh Jal, Phansa jal, Zangad Jal, Bangad jal.	Gorati balai Endi balai.		Valu Vala (unnikutha vala), Endi balai	Kalam Katti valai.		Kala valai, Kattu valai.				Nelotu (pand), Nira.		
II. Bag nets and Pise nets.	Goolwa Dol.	Goolwa. Elhoksi jal, jot.	Mariabie	Vai balai, (nulu balai mari balai).	Kurukku madi.	Chavittu vala, sul- tan vala, vatta vala.		Mada valai (Maru valai, Nida valai, Yeda valai, Kambi valai), Thuri valai, Eru Valai, Chenna Kunni valai, Mul- lu valai.		Pedda valai, Iraga valai, Katta valai, Kavala valai, Nida valai, Mapu valai, "Alivi" valai.	Sutti jal, Bada jal.	Kharki jal, Sha- nla jal.			
III Seine nets.	Jal, Tare- sar, Far- roda (ashbo- da).	Tirgan, Raosi, Adit Dhang- da.			Ddam vala (Peri vala, Patth vala), Vakku vala, Kol vala.	Panthi vala	Vangu valai	Kola valai). Kodava valai, Thiva valai, Valla valai, valai, Kuzhi valai.		Bada jal Endula jal, Sanna valai.	Ber jal, Kodcal jal, (Dingi jal, Jangli- jal).	Kona jal			

gilling nets	dari	(vayri), Bhishi	Mag. Beed net.	balai, Acha balai, Aiburli, balai, Shoraku balai, Patti balai, Kanda balai.	valu, OJu- valu, Nariyan valu, Sravu valu, Thirrandi valu, Aty- luchala valu, Matthchala valu, Kaivala, Muppin valu.	valu, Shamku valu	valu, Kela valu	valu, Kanni, valu, Thirukkai valu, Kottu valu.	valu, Koduva valu	valu, Pusain- aikanni- valu.	(Katla jal), Feripe- tar, Dangri	
V. Inshore drag nets	Bandh jal.	Rampani	Payodha	Rampani	Koru valu.	Vadi valu, Ola valu, Telikanni valu, Pettu- kanni valu.	Ola valu, Kara valu, Otta valu	Perla valu	Konda valu.	Noli	..	Bhiga (Kadh. kurga chatta and maha jal).
VI. Cast nets	Mang. Chogia	Pag. Kakani pag Pagli.	Shendi	Deb balai (many names)	Vichu valu (many different names but col- lectively called "Vichu valu"), Kattum valu (String less cast net).	Vichu valu	Vichu valu (a general name for cast nets).	Khepla jal, Bechari jal (other jal).	Vichu valu	Khepla jal, Bechari jal (other jal).	Khepla jal, Bechari jal (Other jal).	Sorru Werru Dehaju Paika Sotwan
VII. Scoop nets	..	Gada	..	Arippu valu (Vettu valu).	Kai valu (Hand net), Cheena valu or Kambu valu (Chinese dip net).	Kai valu	Seepu valu	Kai valu.	A scoop net in use.	..	Hela jal, Kharra jal, Bhesal jal, Kolla jal (Korsula jal).	Kochbi Dangla Kurli, Saggan.

APPENDIX III—contd.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
VIII. Pouchtrap	..	..	..	..	..	..	..	..	Iriga valai.	Siru valai	..	..	..
IX. Trawl type nets.	..	..	..	..	..	..	Madi valai.	..	..	..	Moi jal	..	..
X. Miscella- neous—													
(a) Long lines	Practised	Practised	Practised	Cheria beppu, Valla beppu	Cheria beppu, Valla beppu or Sravu beppu. Chattuli	..	Practised.	Practised.	Tamani Kayaru.	Practised.	Practised Bersu.	..	Lang (dor) Dori.
(b) Harpoon	..	..	..	..	..	Chattuli	..	..	..	..	..	Ek-Katya	..
(c) Fish spears	..	..	..	..	..	Thumbithan Prangi pathi	..	..	..	..	..	Konch	..
(d) Fish screens	..	..	..	..	..	Kurithi pari	Avoila	..	..	Salwa or puli.	..	Chachi or pail.	..
(e) Fish traps	..	..	..	..	..	Kudu and offal.	Kudu	..	..	..	..	Polo or tappoo.	Chipp.
(f) Baited spring	..	..	..	..	..	..	..	..	..	..	..	Barra (Datia).	..
(g) Angling	Practised.	Practised.	Practised.	Practised.	Practised.	Kaichoonda	Practised.	Practised.	Practised.	Practised.	Practised.	Practised.	Bansi (Bahi cheep).

APPENDIX IV

SCHEDULE OF CONDITIONS FOR PRIVATE FISHERIES FIRMS FOR DEEP SEA FISHING OPERATIONS IN INDIA IN COMBINATION WITH FOREIGN INTERESTS

1. The Indian contribution to the share capital should be at least 51%, but the proportion of Indian capital could be reduced if justifiable reasons exist.
2. Regardless of the ratio of Indian capital the fishing vessels operated by the Company should be registered in India and shall fly the Indian Flag.
3. Vessels of 12 registered tons and above will only operate beyond seven miles from the coast line of India and will not fish in the Gulfs of Kutch, Cambay and Mannar, Palk Bay, Pamban Channel and any other area specified by the Government of India.
4. Vessels of less than 12 tons operating within seven miles from the shore should be manned as far as possible entirely by Indian crew.
5. Fishing vessels of all descriptions should not carry any recording instruments like Bathy-thermographs etc. They should also be open for search by Indian Naval personnel and other Government officers whenever considered necessary.
6. The Company shall not exploit pearl, chank, and other sedentary fisheries.
7. The vessels should be manned by foreign and Indian Officers and crew. The proportion of Indians should be progressively increased so as to completely replace foreign complement in course of time. Every attempt should be made to bestow individual attention on the training of Indian personnel to ensure that they receive training in technology and processing and become duly qualified to operate the vessels ultimately to replace the foreigners.
8. Copies of vessels' log books, catch reports and other scientific data will be furnished for information and examination to the Government of India.
9. Accommodation and messing arrangements on payment should be provided for an Officer appointed by the Government of India to be on board the vessels.
10. Officers of the Government of India or State Governments shall be given facilities to inspect the catches of the Company's vessels at the port of landing. These facilities should also be extended to others authorised by Central or State Governments.
11. The Company will be governed by the export policy as it is applicable to the fishing trade as laid down by the Government of India, from time to time.
12. Catches of quality fish and prawns should as far as possible be processed for export to the foreign markets. High standards of material and methods should be maintained for all exported fish and the Company will conform to rules and regulations that may be issued by the Central or State Governments from time to time.

13. The activities of the Company shall be restricted to fishing and operations connected therewith.

14. The company shall abide by rules framed by the Ministry of Finance, Government of India, in regard to remittance of money to foreign countries.

15. The foreign participants will provide spares at least for five years consumption along with the capital equipment.

World Catch : By groups of species (Live weight, i.e. Whole fresh weight)

Group of species	1953	1954	1955	1956	1957	Average	Percentage
Freshwater fishes	2.51	2.73	2.90	2.96	3.07	2.83	10.1
Salmons, trouts, smelts, etc	0.59	0.60	0.71	0.72	0.71	0.67	2.4
Flounders, Halibuts, soles, etc	0.54	0.54	0.60	0.66	0.66	0.60	2.1
Cods, Lakes, haddocks, etc	3.78	4.18	4.67	4.91	4.48	4.40	15.8
Herrings, Sardines, anchovies, etc	6.24	6.70	6.40	7.01	7.08	6.69	24.0
Tunas, bonitos, mackerels, etc	1.35	1.49	1.53	1.69	1.82	1.58	5.7
Miscellaneous marine teleosteans	2.33	2.44	2.84	2.96	3.12	2.74	9.8
Sharks, rays, etc	0.30	0.30	0.29	0.31	0.32	0.30	1.1
Mixed and unidentified fishes	4.47	4.76	5.05	5.20	5.29	4.95	17.8
Crustaceans	0.68	0.78	0.78	0.82	0.80	0.77	2.8
Molluses	1.70	1.83	1.86	1.86	2.03	1.86	6.7
Aquatic animals, n. e. s.	0.06	0.07	0.08	0.08	0.07	0.07	0.2
Aquatic Plants	0.36	0.38	0.41	0.42	0.51	0.42	1.5
World total	24.91	26.80	28.12	29.60	29.96	27.88	100.0

Source:—Year book of Fishery Statistics by F. A. O. Vol. III 1957.
n. e. s.—not elsewhere.

APPENDIX VI

Composition of (Marine) Fish landings in India

(Quantity in Metric tons).

Groups & Species	1950	1951	1952	1953	1954	1955	1956	1957	Average for the quinquennium ending 1957	Percentage to the total
1. Prawns, Shrimps & other crustacea	74,877	76,797	77,001	90,686	154,225	106,626	159,552	136,812	129,580	19.3
2. Mackerel . . .	89,163	104,900	78,014	70,748	28,258	22,796	16,426	89,006	45,447	6.8
3. Seer fish . . .	6,906	7,091	6,312	4,505	6,255	6,045	12,254	8,910	7,594	1.1
4. Oil-sardines, other sardines Hilsa & other clupeids	132,823	82,957	82,422	91,829	81,745	93,924	80,098	269,980	123,515	18.4
5. Anchovies & Whitebait .	24,620	59,563	41,659	29,097	31,811	25,662	26,995	17,203	26,154	3.9
6. Bombay duck . . .	14,161	7,262	24,647	45,261	36,051	104,117	128,880	119,712	86,804	12.9
7. Jew fish (sciacerinds) .	29,822	33,214	37,378	34,538	73,211	43,282	57,437	29,972	47,688	7.1
8. Ribbon-fish . . .	18,108	16,946	35,667	56,298	29,556	32,671	24,481	38,427	36,287	5.4
9. Cat fishes . . .	11,779	17,347	18,746	23,318	21,697	18,678	23,307	27,378	22,876	3.4
10. Caraugids . . .	6,122	9,819	9,682	7,181	16,409	18,360	56,619	14,001	22,514	3.4

11. Elasmobranchs (Sharks, rays, skates, etc.)	17,362	29,519	38,050	15,912	16,020	20,451	21,856	23,080	19,474	2.9
12. Pomfrets	4,903	9,220	5,923	20,531	18,614	13,682	12,701	16,205	16,347	2.4
13. Polynemids	..	800	1,075	1,011	2,284	11,761	8,998	14,847	7,780	1.2
14. Perches	25,732	3,017	13,261	4,458	4,789	7,075	8,250	6,759	6,266	0.9
15. Silver bellies & Lactarius	15,274	20,028	14,261	9,408	20,648	12,618	27,521	25,962	19,231	2.9
16. Soles	30,194	1,962	6,469	4,794	1,684	5,595	9,122	3,687	4,976	0.7
17. Dorab	7,937	1,269	2,159	2,257	5,379	4,384	6,922	5,816	4,952	0.7
18. Tunas	4,693	848	862	899	2,321	3,371	3,670	3,013	2,655	0.4
19. Flying fish	2,009	2,151	1,374	499	1,966	3,258	2,512	984	1,844	0.3
20. Bregmaceros	2,202	4,831	3,205	14,567	9,753	3,190	1,308	1,138	5,991	0.9
21. Red mullets	1,463	1,525	1,088	1,154	1,537	1,128	10,578	3,055	3,490	0.5
22. Mugil	..	44	297	..	40	208	255	1,048	310	Neg.
23. Sphyrna	..	211	1,518	236	4,052	393	3,358	522	1,712	0.3
24. Miscellaneous	59,871	42,595	27,276	52,273	19,952	36,447	15,602	17,903	28,435	4.2
TOTAL	580,021	533,916	528,346	581,460	588,257	595,722	718,702	875,420	671,912	100.0

Source:—Indian Journal of Fisheries.

APPENDIX VII

Zonal Statistics of total Marine fish landings

Zones	1950	1951	1952	1953	1954	1955	1956	1957	Average for the Quinquennium ending 1957	Percentage to total
1. West Bengal & Orissa	15,687	5,084	6,128	6,882	9,506	5,968	15,882	8,266	9,301	1.4
2. North Andhra Coast (South of Gopalpur to north of Visakhapatnam)	40,470	28,286	27,446	10,335	5,534	10,756	15,394	29,673	14,338	2.1
3. Central Andhra coast (South of Visakhapatnam to Masulipatnam)	41,239	29,915	22,966	31,373	20,158	51,298	33,398	5,499	28,345	4.2
4. South Andhra Coast (South of Masulipatnam to Pulicut lake)	969 (a)	969 (a)	969 (a)	969 (a)	6,432	2,060 (b)	3,684	5,290	3,687	0.6
5. North Coromandal Coast (Pulicut Lake to Cuddalore)	30,285	14,124	8,988	16,907	24,634	12,526	18,282	20,521	18,574	2.8
6. South Coromandal Coast (South of Cuddalore to Devipatnam)	9,653	5,717	9,926	22,137	23,968	15,262	19,508	13,974	18,970	2.8
7. South of Palkbay and Gulf of Mannar (South of Devipatnam to Cape Comorin)	4,031	7,195	13,600	8,045	9,447	9,220	17,418	14,097	11,646	1.7
Total for East Coast	142,334	91,290	90,023	96,648	99,679	107,090	123,566	97,320	104,861	15.6

8. Travancore-Cochin (Cape Comorin to Ponnani River)	93,604	113,104	149,956	61,134	80,050	120,000	155,155	78,405	176,920	92,436	13.8
9. Malabar and South Kanara (North of Ponnani River to Mangalore)	166,329	142,243	51,523	82,893	80,577	43,385		25,901	88,035	48,921	7.3
10. Konkan & Kanara Coast (North of Mangalore to South of Ratnagiri)	40,428	66,404	88,688	66,843	29,321	34,505					
11. Bombay & Gujarat Coast (Ratnagiri to Broach)	117,717	99,005	129,748	246,058	280,246	272,103		324,127	312,308	286,968	42.7
12. Saurashtra & Gujarat coast	15,937	17,761	16,606	20,350	17,396	18,299		29,792	32,407	23,649	3.5
Total for West coast	434,015	438,517	436,521	483,278	487,590	488,295		591,961	773,768	564,978	84.1
13. Mechanised vessels	3,672	4,109	1,802	1,534	988	337(c)		3,175	4,332	2,073	0.3
Grand Total	580,021	533,916	528,346	581,460	588,257	595,722		718,702	875,420	671,912	100.0

(a) No data were collected in Zone 4 during the four years from 1950 to 1953. The figures given is the estimate as obtained from an incomplete survey in 1949.

(b) No data were collected in South Andhra Coast, the figures given is the average of last five years.

(c) The figures for mechanised vessels for 1955 relate only the landings of Government of India cutters and Reckie boats operating in Bombay. The data of catches obtained by powered vessels operating elsewhere have not yet been received from the State Governments. The landing for indigenous boats filled with motors and operating in Bombay waters have been included in the figures of landings in Bombay Zone.

Source:—Government of India, Central Marine Fisheries Research Station, Mandapam Camp.

APPENDIX VIII

Certain particulars regarding fish supply at a few important places in India

Place	Estimated total amount of fresh fish available (in maunds)* (1956-57)	Particulars regarding varieties, seasons of availability, etc.
Bombay City	900,000 (33,592)	Bombay Duck 29.5% (all thro., Max. between June & Nov.); Mackerels and perches 9.8% (Sept. to Feb.); Crustaceans 9.8% (all thro., Max. Aug. to December); Elasmobranchs 8.6% (Nov. to March); Pomfrets 8.6% (Oct. to March); Jey fishes 8.0% (all thro., Max. between Oct. and Jan.); Indian salmon 3.1% (all through); Beekti 2.2% (all thro.).
Malpe (South Kanara Dt.)	400,000 (14,930)	Mackerels and perches 30.0% (Oct. to Nov. Dec.); Herrings and the Anchovies 25.0% (Oct., Nov., Dec.); Soles 5.0% (Sept. to Dec.); Crustaceans 4.0% (June to Aug. and Feb.); Cat-fishes 4.0% (Oct. to March); Elasmobranchs 3.0% (Aug. to Dec.).
Mangalore (South Kanara Dt.)	38,000 (1,418)	Mackerels and perches 20.0% (Oct., Nov. Dec.); Herrings and the Anchovies 30.0% (Oct., Nov., Dec.); Soles 13.2% (Sept. to Oct.); Cat-fishes 10.3% (Oct. to March); Elasmobranchs 5.0% (Aug-Dec.).
Calicut (Malabar Dt.)	1,91,838 (7,160)	Mackerels and perches 21.5% (Sept. to Feb.); Herrings and the Anchovies 14.8% (Oct., Nov., Dec.); Soles 11.7% (Sept. to Oct.); Cat-fishes 10.4% (March, April, May).
Tanur (Malabar Dt.)	1,51,457 (5,653)	Herrings and the Anchovies 20.0% (Oct. to Nov., Dec.); Mackerels and perches 15.0% (Sept. to Dec.); Soles 13.2% (Sept. to Oct., Nov.); Silver-bellies 12.4% (May to Aug., Sept., Oct.); Cat-fishes 8.2% (March to April, May); Elasmobranchs 6.0% (Aug. to Dec.); Prawns 5.0% (Aug. to Feb.).
Narakkals (Cochin)	25,000 (933)	Crustaceans 38.0% (all thro., Max. from Dec. to April); Mackerels and perches 16.3% (Sept. to Feb.); Herrings and the Anchovies 9.6% (all thro., except May and June); Flat fishes 5.0% (Aug., Sept., Oct.).

*Figures in brackets are in Metric tons.

APPENDIX VIII—*contd.*

Place	Estimated total amount of fresh fish available (in maunds)* (1956-57)	Particulars regarding varieties, seasons of availability, etc.
zhingom (Travancore)	50,000 (1,866)	Mackerels and perches 36.7% (all thro., Max. from July to Jan.); Herrings and the Anchovies 33.6% (all thro., Max. between Aug. and Jan.); Crustaceans 9.6% (all thro., Max. between Feb. and Sept.) ; Elasmobranchs 4.2% (all thro. peak from August to November).
olachel . . .	44,235 (1,651)	Mackerels and perches 30.0% (all thro., Max. from July to Jan.); Herrings and the Anchovies 25.0% (all thro., Max. between Aug. and Jan.) ; Crustaceans 12.0% (all thro., Max. between Feb. and Sept.) ; Elasmobranchs 6.0% (all thro. peak from Aug. to Nov.).
utticorin (Turunelveli Dt.)	19,033 (710)	Chirocentrus dorab 32.2% (all thro., Max. between Jan. and July); Mackerels and perches 30.4% (good supply all thro.); Herrings and the Anchovies 14.6% (Sept. to April), Jew fishes 8.9% (Nov. to March).
Madras City . . .	2,54,845 (9,512)	Crustaceans 25.3% (all thro., Max. Jan. and Feb.); Mackerels and perches 24.0% (all thro., Max. Jan., Feb. and Sept.); Herrings and the Anchovies 10.0% (all thro.); Silver-bellies 6.5% (all thro.); Mulletts 4.3% (all thro., Max. Feb. and March); Elasmobranchs 2.7% (all thro.); Pomfrets 1.2% (all through; Max. Aug. and Sept.); Indian salmon 0.4% (all through).
Calcutta City. . .	11,00,000 (41,057)	Cat-fishes 25.0% (Sept. to March), Carps 22.0% (Oct. to March, Max. Dec. to Feb.); Herrings and the Anchovies 17.0% (all thro., Max. June to Aug.); Prawns 11.0% (all thro., Max. Dec. to April); "Live" fishes 7.5% (all thro., maximum Nov. to Feb.); mulletts 6.0% (all thro., peak in cold months); Feather backs 3.5% (all thro., peak in cold months); Indian salmon 1.3% (Sept. to march).

*Figures in brackets are in Metric tons.

APPENDIX VIII—*contd.*

Place	Estimated total amount of fresh fish available (in maunds)* (1956-57)	Particulars regarding varieties, seasons of availability, etc.
Delhi	24,000 (896)	Carps 40·0% (all thro., except Aug. to Oct.) Cat-fishes 25·0% (all thro., except Aug. to Oct.); Pomfrets 7·4% (Nov. to Feb.) Herrings and the Anchovies 4·9% (Nov. to Feb.); Crustaceans 3·9% (Nov. to Feb.); Mackerels and perches 3·4% (Nov. to Feb.).
Uppada (E. Godavari).	56,355 (2,103)	Jew fish 52% (All through the year); Pomfrets 0·8% (During July to Sept., Feb. April and May,) Prawns 9·2% (Throughout the year except October and November) and Ribbon fish 9·5% (Throughout the year except October, November January and June.)

*Figures in brackets are in Metric tons.

Particulars	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956 Apr. Dec.	1957	1958
1. Fish, dried unsalted	33.8	55.6	48.9	39.2	22.2	16.4	16.0	30.1	8.1
2. Fish, dried salted	22.0	14.7	9.0	9.8	11.1	15.1	9.9	0.9	0.2
3. Fish, wet salted	21.8	12.4	12.4	10.9	10.2	7.6	5.1	15.2	25.1
4. Prawns (fresh, chilled, frozen, salted, dried or simply cooked)	..	..	..	..	..	..	..	0.4	..
5. Fish other sorts	6.1	4.2	1.8	3.2	3.0	5.0	3.2	..	..
6. Fish canned	1.4	12.4	2.3	3.5	4.2	7.0	5.0	6.9	1.4
7. Fish products, not canned	..	..	..	..	..	..	..	0.4	0.06
8. Fish maws and sharkfins.	1.3	1.0	1.2	0.6	0.3	0.05	0.002	0.5	0.1
9. Cod liver oil	1.2	1.8	1.1	1.9	0.9	0.8	0.8	0.1	0.5
10. Fish oil—whale oil	1.0	2.1	0.3	1.2	0.4	0.6	1.4	2.8	1.1
other oil	388	3051	3156	3919	42933	46990	17520	0.5	0.7
	gal.	gal.	gal.	gal.	gal.	gal.	gal.		400 lbs.
11. Fish eggs for breeding	..	..	..	..	..	..	..	..	
12. Fish (fresh, chilled & frozen) mostly from E. Pakistan	115.5	74.9	116.9	183.9	287.1	408.7	346.4	263.6	182.4
(For calendar years from 1950)									
TOTAL	204.1 + 388 gal.	179.1 + 3051 gal.	193.9 + 3156 gal.	254.2 + 3919 gal.	339.4 + 42933 gal.	461.25 + 46990 gal.	387.802 + 17520 gal.	321.4	219.66 + 400 lbs.

APPENDIX IX(b)

(Value of imports in '000 Rs.)

Particulars	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956 April- Dec.)	1957	1958
1. Fish, dried unsalted	399	783	745	670	397	379	282	993	449
2. Fish, dried salted	821	521	318	336	248	336	215	53	15
3. Fish, wet salted	805	577	555	339	493	362	239	725	947
4. Prawns (fresh, chilled, frozen, salted dried or simply cooked)	..	..	..	..	..	..	..	36	..
5. Fish other sorts	209	258	207	219	270	394	246	..	..
6. Fish canned	166	2,332	366	468	600	1,113	733	1,009	191
7. Fish products, not canned	..	..	..	..	..	..	..	46	7
8. Fish maws and sharkfins.	36	31	58	48	18	2	1	50	13
9. Cod liver oil	234	305	187	289	95	144	106	11	32
10. Fish oil—whale oil	66	212	21	67	27	43	103	187	84
Other oil	146	239	199	339	302	388	155	193	68
11. Fish eggs for breeding	..	..	..	..	..	..	..	..	13
12. Fish (fresh, chilled & frozen) mostly from East Pakistan	..	13,066	13,360	15,940	25,935	29,426	15,670	19,757	19,015
TOTAL	2,882	18,324	16,016	18,715	28,385	32,587	17,750	23,060	20,834

APPENDIX X

Periodicity of imports of fish into India.

(Percentage to total annual imports.)

Month	Preserved fish (Average for 1951-52 to 1955-56)						Canned fish (Average for four years ending 1956-57)	Fish (fresh, chilled and frozen) from East Pakistan to Calcutta & Howrah markets (Average for four years ending 1956)	Cod liver oil (Average for four years ending 1956-57)	Whale oil (Average for four years ending 1956-57)
	Fish, dry unsalted	Fish, dry salted	Fish, wet salted	Fish, maws & shark-fins	Other sorts	Total				
April	13.9	7.7	27.9	43.0	9.5	15.1	6.3	2.5	5.1	1.9
May	8.6	14.0	15.7	3.0	18.2	11.3	4.4	2.4	6.4	5.8
June	12.8	34.2	1.9	5.8	16.8	15.1	5.8	6.7	3.9	3.3

August	2.0	1.4	0.6	0.2	6.6	3.9	8.6	11.4	5.5	13.5
September	5.8	0.6	0.6	0.2	6.6	3.9	8.6	11.4	5.5	13.5
October	3.8	3.0	..	..	4.5	3.0	10.0	7.2	6.2	5.2
November	5.2	7.3	6.3	28.0	4.8	6.0	8.6	9.6	7.2	10.2
December	4.9	6.1	3.5	3.4	4.4	4.8	9.7	12.3	11.9	13.7
January	12.9	4.5	24.4	7.2	6.0	12.9	9.6	12.2	13.6	15.5
February	14.1	1.4	12.4	8.4	8.3	11.1	11.1	11.1	18.6	7.8
March	8.5	11.4	6.6	0.6	7.5	8.6	11.6	7.6	9.7	9.5
TOTAL QUANTITY (CWTS)	36,448	11,922	10,712	639	3,430	63,151	5,531	15,570	1,296	979

APPENDIX XI(a)

Exports of fish and fish products from India

(Quantity in '000 Cwts.)

Particulars	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956 (Apr.- Dec.)	1957	1958
1. Fish, dried unsalted	181.8	201.8	261.7	356.5	289.0	215.9	181.9	73.1	117.3
2. Fish, dried salted	174.1	211.8	199.0	173.3	179.4	165.2	160.4	156.0	303.0
3. Fish, wet salted	25.7	16.5	21.6	20.4	14.2	24.3	2.0	11.8	22.3
4. Fish (fresh, chilled or frozen, salted, dried, or simply cooked)	..	..	..	..	..	..	..	2.3	1.3
5. Prawn (fresh, chilled, frozen, salted, dried or simply cooked)	..	..	..	..	..	..	..	116.8	100.3
6. Other crustacea and molluscs	..	..	..	..	..	..	..	3.4	1.3
7. Fish canned	..	..	..	..	..	..	..	0.3	2.1
8. Fish products not canned	..	..	..	..	..	..	..	22.5	21.0
9. Fish meal	..	..	..	..	..	..	..	7.4	12.4

10. Fish manure and fish guano .	0.04	1.2	1.2	51.0	11.0	01.8	2.4	2.0	2.0
11. Fish maws and sharkfins .	5.2	5.2	5.5	6.1	4.2	4.7	3.4	5.1	5.6
12. Oil from fish and other animals .	..	..	..	..	..	..	..	0.7	7.8
TOTAL .	386.84	436.5	489.0	607.3	563.8	471.9	357.1	448.4	604.0

APPENDIX XI(b)

(Value of exports in '000 Rs.)

Particulars	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956 (Apr.- Dec.)	1957	1958
1. Fish, dried unsalted	13,058	17,866	23,777	28,375	27,530	20,245	18,030	7,688	11,925
2. Fish, dried salted	9,688	13,115	12,710	12,966	15,804	15,655	17,584	16,338	24,855
3. Fish, wet salted	545	180	425	507	438	597	370	301	369
4. Fish (fresh, chilled or frozen).	..	..	..	..	..	..	..	216	134
5. Prawn (fresh, chilled, frozen, salted, dried or simply cooked)	..	..	..	..	..	..	..	17,375	17,261
6. Other crustacea and molluscs	..	..	..	..	..	..	..	735	320
7. Fish canned	..	..	..	..	..	..	..	143	971
8. Fish products not canned	..	..	..	..	..	..	..	327	265
9. Fish meal	..	..	..	..	..	..	..	583	275
10. Fish manure and fish guano	3	30	19	998	1,772	1,616	227	627	203
11. Fish maws & sharkfins	1,265	1,672	1,769	1,187	1,131	1,106	990	1,497	1,827
12. Oil from fish and other animals	..	..	..	..	..	..	..	31	242
TOTAL	24,559	32,863	38,700	44,033	46,675	39,219	37,201	45,861	58,647

APPENDIX XII

Periodicity of exports of fish (Average for the Quinquennium ending 1955-56)

Month		(Quantity in Cwts.)									
		Fish, dry un-salted		Fish, dry salted		Fish maws and sharkfins		Fish, wet salted		Total fish (excluding canned fish)	
		Quantity	Percentage	Quantity	Percentage	Quantity	Percentage	Quantity	Percentage	Quantity	Percentage
April	.	9,432	3.6	2,400	1.3	462	9.0	2,313	11.9	14,607	3.1
May	.	23,132	8.7	8,718	4.7	418	8.1	52	0.3	32,320	6.8
June	.	24,622	9.3	12,379	6.7	439	8.5	73	0.4	37,513	7.9
July	.	22,275	8.4	9,743	5.2	363	7.0	2	..	32,383	6.8
August	.	23,360	8.8	9,121	4.9	275	5.3	..	..	32,756	6.9
September	.	27,968	10.5	13,011	7.0	175	3.4	21	0.1	41,175	8.7
October	.	23,832	9.0	17,788	9.6	287	5.6	..	..	41,907	8.8
November	.	25,094	9.5	16,262	8.7	324	6.3	..	..	41,680	8.8
December	.	20,896	7.9	20,171	10.9	597	11.6	88	0.4	41,752	8.8

January	.	.	.	21,399	8.1	26,928	14.5	606	11.7	4,474	23.1	53,407	11.2
February	.	.	.	18,371	6.9	23,044	12.4	396	7.7	3,604	18.6	45,415	9.5
March	.	.	.	24,608	9.3	26,147	14.1	813	15.8	8,759	45.2	60,327	12.7
TOTAL				264,989	100.0	185,712	100.0	5,155	100.0	19,386	100.0	475,242	100.0

APPENDIX XIII

Utilization of fish in India.

State	Annual Production (In thousand metric tons)	Consumed as fresh fish		Converted into sun dried.		Converted into salted fish		Converted into manure	
		Quantity ('000 metric tons)	Percentage	Quantity ('000 metric tons)	Percentage	Quantity ('000 metric tons)	Percentage	Quantity ('000 metric tons)	Percentage
Andhra Pradesh	82.97	77.25	93.1	3.40	4.1	2.32	2.8	Neg.	Neg.
Assam	1.20	1.13	93.9	0.07	6.1	..	..	..	..
Bihar	37.30	37.08	99.4	0.22	0.6	..	..	..	..
Bombay	340.11	157.81	46.4	74.82	22.0	68.70	20.2	38.78	11.4
Delhi	1.10	1.10	100.0	..	..	..	..	..	..
Himachal Pradesh	0.20	0.20	100.0	..	..	..	..	..	..
Jammu & Kashmir	0.70	0.70	100.0	..	..	..	..	..	..
Kerala	158.70	56.50	35.6	51.26	32.3	44.12	27.8	6.82	4.3
Madhya Pradesh	3.50	3.50	100.0	..	..	..	..	..	..

[illegible]

APPENDIX XIV

Average annual wholesale prices of the main groups of sea-fish in the chief producing areas of India

(Data relate to 1957)

(Rupees per maund)

Group of Fish	S. Kan- ara	Kerala	Tiru- nelvelli	Nellore Dist.	E. Go- davari District	West Bengal	Orissa	Bombay	
								Ratna- giri	Surat
Elasmobranchs	16.33	10.25	15.38	20.50	16.00	20.00	15.00	14.25	18.00
Cat-fishes	16.00	15.37	10.25	18.00	24.00	40.00	35.00	18.00	20.00
Dorab	17.00	20.50	20.50	20.50	24.00	..	..	18.00	21.00
Oil-sardines	12.00	16.50	..	..	16.00	..	20.00	14.00	..
Hilsa	..	..	30.75	24.00	25.00	45.50	40.00	..	15.00
Bombay Ducks	..	..	..	..	..	..	..	12.00	14.25
Anchovies	9.00	..	15.13	20.00	20.00	15.00	..	15.00	19.00
Mackerels	16.00	15.37	16.25	18.37	24.00	..	..	16.00	..
Seer	25.00	30.75	33.00	32.00	32.00	..	..	20.00	23.00
Beckti	..	30.75	31.00	30.50	32.00	46.00	41.00	29.50	33.00

Pomfret	.	.	.	.	.	23.00	25.62	31.00	31.00	31.00	30.00	..	35.00	36.00	32.00
Flat-fish	.	.	.	.	.	10.00	15.37	10.25	10.25	10.25	16.00	20.00	18.00	18.00	19.00
Mulletts	.	.	.	.	.	..	20.50	10.25	10.25	20.50	..	40.00	40.00	23.00	25.00
Indian Salmon	.	.	.	.	.	..	20.50	30.75	30.75	20.00	32.00	..	..	26.00	24.50
Jew Fish	.	.	.	.	.	11.00	15.37	10.25	10.25	15.37	25.00	35.00	30.00	18.00	25.00
Prawns	.	.	.	.	.	15.00	15.37	30.75	30.75	21.00	28.00	48.00	45.00	25.00	28.00
Miscellaneous	.	.	.	.	.	10.25	7.69	7.50	7.50	7.00	10.00	25.00	15.00	12.00	16.00

APPENDIX XV

Annual average wholesale price of the main groups of fresh water fish in producing areas of various states of India
(Data relate to 1957)

(Rupees per maund)

Name of the State	Carps	Cat-fishes	Live-fishes	Feather-backs	Hilsa	Prawns	Eels	Miscellaneous
1. Assam	60·00	55·00	50·00	55·00	60·00	..	..	40·00
2. Andhra Pradesh	30·75	30·75	51·25	25·63	..	61·50	..	20·50
3. West Bengal	47·50	40·00	50·00	40·00	45·50	43·00	35·00	40·00
4. Bihar	45·50	42·26	45·00	40·00	43·75	..	32·50	20·00
5. Madras	27·58	30·05	35·00	27·00	31·18	34·94	35·00	17·15
6. Mysore	41·00	30·75	50·00	20·50	..	60·00	..	19·75
7. Madhya Pradesh	40·00	30·00	50·00	35·00	..	..	20·00	15·00
8. Orissa	60·00	50·00	55·00	49·00	63·00	..	36·00	30·00
9. Uttar Pradesh	34·71	24·71	37·00	29·00	35·00	..	24·00	20·00
10. Kerala	25·62	20·50	..	..	..	15·37	..	..

Average wholesale prices of the main varieties of dried fish in certain centres

(Data relate to 1957)

Variety	Orthanad (Tanjore Dist.)	Kondi- thopa Madras Dist.	Malapa- layam Tirunelveli Dist.	Parama- kudi Ramana- thapuram, Dist.	Dowlesh- waram E. Goda- wari District	Kharpai Midnapur District	Chilka Ganjam District	Calcutta
Elasmobranchs	10.50	25.00	15.00	27.00	..	..	..	55.00
Cat-fishes	20.25	35.50	32.33	28.67	30.00	..	..	..
Sardines	..	..	23.00	..	..	..	..	25.00
Hilsa	..	37.50	29.00	..	..	..	42.50	55.00
Jew-fish	20.00	22.00	18.00	19.00	31.00	..	..	..
Mulletts	..	..	38.00	..	31.00	..	..	..
Pomfrets	38.00	60.00	40.75	54.00	51.50	..	40.00	65.00
Seer	38.00	62.00	42.00	58.00	52.00	..	..	..
Mackerel	..	24.00	21.00	..	..	..	..	40.00
Ribbon fish	..	..	..	..	..	28.00	38.75	46.50
Bombay Ducks	..	..	..	..	..	..	..	..
Beckti	..	..	..	..	..	..	44.00	60.00
Prawns (Salted)	40.00	58.00	49.50	..	..	..	42.50	85.00
Prawns (Unsalted)	21.75	27.00	20.25	..	39.00	19.00	40.00	55.00
Indian Salmon	35.00	61.00	41.50	40.00	51.50	..	30.00	41.50
Miscellaneous	8.16	14.75	10.50	10.75	11.00	..	..	..

(Rupees per maund)

APPENDIX XVII

Average monthly wholesale prices of fish at Bombay & Calcutta during 1952-53 to 1956-57
(Rupees per maund)

1952-53	Bombay					Calcutta			
	Cat-fish	Hilsa	Prawns	Pomfret	Beckte	Rohu	Beckte	Hilsa	Chingri (Bagda)
April . . .	41.14	41.14	87.17	77.14	51.43	88.75	115.00	80.00	85.00
May . . .	29.83	66.86	79.71	82.29	N.Q.	93.00	108.00	N.S.	83.00
June . . .	30.86	82.29	82.29	92.57	82.29	92.50	138.75	97.50	87.50
July . . .	N.Q.	72.00	61.71	92.57	82.29	91.25	130.00	105.00	100.00
August . . .	82.29	79.71	61.71	115.20	102.86	116.00	116.00	120.00	86.00
September . . .	51.43	51.42	48.85	77.14	74.57	82.50	110.00	101.25	70.00
October . . .	37.29	43.79	54.85	54.00	61.71	97.50	115.00	90.00	110.00
November . . .	32.91	38.06	38.57	41.66	N.Q.	90.00	108.00	90.00	119.00
December . . .	25.71	30.85	25.71	38.57	N.Q.	70.00	88.33	67.67	88.33
January . . .	34.97	N.Q.	47.31	54.51	N.Q.	72.00	83.00	68.75	85.00
February . . .	30.86	38.57	63.00	68.14	N.Q.	75.00	83.25	70.00	84.33
March . . .	30.85	46.29	54.00	61.71	N.Q.	75.00	85.00	73.33	N.Q.
AVERAGE	38.92	53.73	58.74	71.29	75.86	86.96	106.69	87.59	90.74

1953-54	Bombay					Calcutta			
	Cat-fish	Hilsa	Prawns	Pomfret	Beckte	Rohu	Beckte	Hilsa	Chingri (Bagda)
April . . .	34.73	61.71	68.14	70.29	N.Q.	77.67	88.33	70.00	N.Q.
May . . .	39.08	64.80	67.88	54.51	46.28	83.00	98.00	75.00	90.00
June . . .	34.71	61.71	51.43	46.29	N.Q.	72.50	88.75	71.33	83.75
July . . .	35.35	63.00	113.14	72.00	64.28	86.33	85.00	86.33	85.00
August . . .	36.00	83.31	51.43	98.74	72.00	95.00	108.00	103.00	90.00
September . . .	36.00	89.14	64.30	87.43	N.Q.	85.00	101.25	85.00	77.50
October . . .	29.32	38.57	43.71	59.79	N.Q.	70.00	86.67	66.67	63.33
November . . .	25.72	36.00	41.14	36.00	N.Q.	71.25	81.25	66.25	67.50
December . . .	27.00	56.58	51.43	54.86	N.Q.	61.25	72.50	60.00	58.75
January . . .	36.17	54.00	72.00	63.00	N.Q.	53.75	70.00	58.75	60.00
February . . .	29.91	61.69	N.Q.	60.44	41.14	66.67	81.67	50.00	88.33
March . . .	30.85	68.56	N.Q.	65.14	77.14	62.50	83.75	55.00	98.75
AVERAGE . . .	32.90	61.59	62.46	64.04	60.17	73.74	87.10	70.61	78.45

APPENDIX XVII—contd.

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1954-55	Bombay				Calcutta				
	Cat-fish	Hilsa	Prawns	Pomfret	Beckte	Rohu	Beckte	Hilsa	Chingri (Bagda)
April . . .	29.56	66.84	51.44	82.28	N.Q.	80.00	98.75	58.75	83.75
May . . .	25.18	77.14	N.Q.	98.78	N.Q.	81.00	105.00	73.00	77.50
June . . .	41.14	N.Q.	N.Q.	87.44	N.Q.	66.25	107.50	71.25	73.75
July . . .	30.85	74.06	82.29	102.87	82.29	72.50	111.25	81.25	78.75
August . . .	26.99	51.43	41.14	79.71	N.Q.	76.25	115.00	87.50	90.00
September . . .	30.00	59.29	61.71	69.43	N.Q.	66.67	100.00	55.00	76.67
October . . .	21.60	N.Q.	38.06	60.17	N.Q.	85.00	75.00	55.00	80.00
November . . .	27.00	N.Q.	33.43	52.71	N.Q.	57.50	71.25	31.25	90.00
December . . .	41.14	N.Q.	59.14	82.29	N.Q.	56.67	81.67	41.67	103.33
January . . .	20.56	N.Q.	45.26	78.18	N.Q.	63.75	81.25	48.75	117.50
February . . .	22.49	N.Q.	48.86	77.15	N.Q.	63.33	78.33	66.67	113.33
March . . .	20.56	N.Q.	51.44	90.01	N.Q.	75.00	88.75	58.75	107.50
AVERAGE . . .	28.09	65.55	51.28	80.08	82.29	70.33	92.81	60.74	90.00

1955-56	Bombay					Calcutta			
	Cat-fish	Hilsa	Prawns	Pomfret	Beckte	Rohu	Beckte	Hilsa	Chingri (Bagda)
April . . .	22·63	N.Q.	51·44	111·08	N.Q.	93·00	97·00	66·00	90·00
May . . .	20·56	N.Q.	41·71	123·47	N.Q.	100·00	88·75	68·75	82·50
June . . .	20·56	N.Q.	48·86	123·44	N.Q.	102·50	95·00	81·25	83·75
July . . .	20·56	N.Q.	30·85	123·44	N.Q.	90·00	111·00	65·00	69·00
August . . .	20·56	N.Q.	30·85	113·15	N.Q.	102·50	122·50	76·25	75·00
September . . .	20·56	N.Q.	33·44	123·44	N.Q.	91·25	90·00	53·75	73·75
October . . .	20·56	N.Q.	32·93	111·44	N.Q.	96·25	80·00	62·50	75·00
November . . .	19·28	N.Q.	30·85	97·72	N.Q.	88·75	75·00	36·75	77·50
December . . .	20·56	N.Q.	39·08	119·32	N.Q.	81·25	60·00	41·39	90·00
January . . .	20·56	N.Q.	37·71	102·87	N.Q.	78·75	70·00	42·50	90·00
February . . .	20·56	N.Q.	41·12	105·44	N.Q.	82·50	77·50	51·25	N.Q.
March . . .	20·56	N.Q.	41·12	106·81	N.Q.	86·25	71·25	50·00	120·00
AVERAGE . . .	20·63	N.Q.	38·33	113·47	N.Q.	91·08	86·50	57·95	84·23

APPENDIX XVII—contd.

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1956-57	Bombay					Calcutta			
	Cat-fish	Hilsa	Prawns	Pomfret	Beckte	Rohu	Beckte	Hilsa	Chingri (Bagda)
April . . .	20.56	N.Q.	41.12	102.87	N.Q.	95.00	86.67	57.50	80.00
May . . .	20.56	N.Q.	41.12	102.87	N.Q.	100.00	88.75	62.50	71.25
June . . .	20.56	N.Q.	43.19	106.99	N.Q.	90.00	N.Q.	60.00	68.75
July . . .	20.56	N.Q.	43.70	107.14	N.Q.	108.33	90.00	80.00	75.00
August . . .	20.56	N.Q.	43.72	113.16	N.Q.	106.25	98.75	76.25	67.50
September . . .	20.56	N.Q.	37.02	102.69	N.Q.	105.00	71.25	65.00	65.00
October . . .	20.56	N.Q.	41.12	102.87	N.Q.	89.75	58.75	50.00	68.75
November . . .	20.56	N.Q.	41.12	100.29	N.Q.	85.00	81.25	57.50	80.00
December . . .	20.56	N.Q.	41.12	82.29	N.Q.	84.00	69.00	52.00	90.00
January . . .	20.49	N.Q.	41.12	82.29	N.Q.	87.50	77.50	50.00	N.Q.
February . . .	20.56	N.Q.	41.12	87.42	N.Q.	100.00	86.25	67.50	N.Q.
March . . .	17.14	N.Q.	36.00	82.46	N.Q.	100.00	77.50	67.50	N.Q.
AVERAGE . . .	20.27	..	40.95	97.78	..	95.90	80.52	62.15	74.03

APPENDIX XVIII

Average monthly wholesale prices of fish at Madras (Rupees per maund)

Months	Freshwater fish			Sea fish					
	Carps	Prawns	Cat-fish	Cat-fish	Hilsa	Prawns	Pom-fret	Perch	Seer
January '56	27.43	31.56	27.44	28.81	26.75	34.31	49.37	29.81	54.87
February	28.81	32.94	28.81	31.87	28.81	39.12	43.25	32.94	51.44
March	28.81	37.87	28.81	32.12	28.81	41.12	46.12	34.56	53.50
April	28.81	35.00	29.81	28.81	41.12	41.12	49.37	34.31	53.50
May	28.81	35.00	30.87	30.19	32.94	39.12	45.25	37.06	47.31
June	30.87	32.94	37.00	30.87	41.12	38.00	49.37	39.94	49.37
July	26.75	32.94	30.87	30.87	28.81	32.94	39.12	37.06	49.37
August	24.69	32.94	30.87	28.81	30.87	38.00	39.12	37.06	49.37
September	26.75	37.00	30.87	28.81	33.94	37.06	45.25	34.31	49.37
October	26.06	27.44	28.81	28.81	30.19	38.44	41.19	32.94	49.37
November	24.69	32.94	27.75	28.81	28.81	36.00	41.19	32.94	49.37
December	24.69	38.00	28.81	28.81	28.81	38.05	41.19	32.94	49.37
AVERAGE	27.26	33.88	30.06	29.80	31.75	37.77	44.15	34.57	50.52

APPENDIX XVIII—*contd.*

Months	Freshwater fish			Sea fish				
	Carps	Prawns	Cat-fish	Hilsa	Prawns	Prom-fret	Perch	Seer
January '57	24.69	38.00	28.81	28.81	37.00	41.19	30.87	49.37
February	24.69	32.94	28.81	28.81	37.00	41.19	37.00	49.37
March	24.69	36.00	28.81	28.81	37.00	41.19	37.00	49.37
April	24.69	32.94	28.87	28.81	37.00	41.19	37.00	49.37
May	24.69	33.94	28.87	28.81	37.00	41.19	35.00	49.37
June	24.69	N.Q.	24.69	28.81	33.75	49.37	28.81	49.37
July	24.69	N.Q.	24.69	28.81	28.81	57.62	28.81	53.50
August	24.69	N.Q.	24.69	28.81	35.69	49.37	28.81	55.50
September	24.69	28.81	N.Q.	28.81	41.12	N.Q.	28.81	53.50
October	26.75	N.Q.	N.Q.	N.Q.	22.62	N.Q.	41.12	53.50
November	24.69	41.12	24.69	N.Q.	41.12	N.Q.	35.00	52.12
December	N.Q.	28.69	26.62	N.Q.	41.12	N.Q.	32.94	57.62
AVERAGE	24.88	34.06	26.95	28.81	35.77	45.29	33.43	51.83

APPENDIX XIX

Average monthly wholesale prices of fish at Patna

(Per maund)

Months	Rohu (Major carps)			Garai (Cat-fish)		
	1952-53	1953-54	1954-55	1952-53	1953-54	1954-55
	Rs. nP.	Rs. nP.	Rs. nP.	Rs. nP.	Rs. nP.	Rs. nP.
April	95.00	56.00	73.50	64.00	39.00	22.00
May	85.00	62.50	77.00	45.00	38.50	22.50
June	95.00	77.00	77.50	52.50	45.00	27.50
July	110.00	88.50	88.50	52.50	32.50	34.00
August	71.62	86.50	93.00	52.50	33.50	33.50
September	60.00	80.50	92.50	52.50	28.50	33.50
October	66.50	77.00	92.50	27.50	31.50	33.50
November	73.00	77.50	92.50	45.50	24.00	33.50
December	77.50	81.00	92.50	39.50	27.50	33.50
January	67.00	76.00	62.50	37.50	17.50	22.50
February	61.00	74.50	77.50	52.50	22.50	29.50
March	69.00	75.00	57.50	48.50	27.50	23.50
AVERAGE	77.55	76.00	81.42	47.50	30.62	29.08

APPENDIX (XX) A

Statement showing the month end retail prices of fish at Calcutta

(Rupees per seer)

Months	1954-55				1955-56				1956-57			
	Rohu	Bac-kte	Hilsa	Pra-wns	Rohu	Bac-kte	Hilsa	Pra-wns	Rohu	Bac-kte	Hilsa	Pra-wns
April	2.25	2.50	1.50	2.00	2.75	2.75	2.50	2.75	2.75	..	1.75	2.00
May	2.75	3.50	2.25	3.00	3.00	2.75	2.25	2.50	2.75	2.75	1.75	2.25
June	2.00	3.00	2.00	2.00	3.00	2.50	2.25	2.50	3.00	3.00	1.75	2.50
July	2.25	3.00	3.00	2.50	3.00	3.00	2.25	2.00	2.75	2.50	2.25	2.25
August	2.00	3.25	2.25	2.50	2.75	3.00	1.75	2.25	3.00	2.00	1.75	1.75
September	2.00	2.75	1.50	2.25	3.00	2.00	1.50	2.00	3.25	2.25	1.75	1.75
October	1.75	2.00	1.00	2.75	3.00	2.25	1.25	2.75	2.75	1.75	1.75	2.25
November	1.87	2.75	1.50	3.00	..	..	..	..	2.50	2.12	1.50	3.00
December	2.00	2.37	1.75	3.00	2.25	2.00	1.25	..	2.50	1.87	1.50	..
January	1.50	1.87	1.75	2.25	2.50	1.75	1.50	..	2.50	2.25	1.50	..
February	2.25	2.12	1.50	2.50	2.75	2.00	1.50	4.00	2.50	2.25	1.37	..
March	2.06	2.65	1.82	2.52	2.80	2.40	1.80	2.59	2.19	1.75	1.50	..
AVERAGE									2.70	2.15	1.68	2.22

Source :—Bulletin of Agricultural Prices issued by Directorate of Economics & Statistics.

APPENDIX XX (B)

Statement showing the month end prices of fish at Madras

Months	Fresh water Fish												Sea Fish											
	1954-55				1955-56				1956-57				1954-55				1955-56				1956-57			
	Carps	Pra-wns	Cat-fish		Carps	Pra-wns	Cat-fish		Carps	Pra-wns	Cat-fish		Cat-fish	Pra-wns	Pom-frets	Perch	Cat-fish	Pra-wns	Pom-frets	Perch	Cat-fish	Pra-wns	Pom-frets	Perch
April	1.00	1.17	0.90		0.89	1.42	0.86		0.71	1.16	0.83		1.42	1.61	1.77	1.67	0.86	1.57	1.74	1.48	0.83	1.42	1.94	0.90
May	1.16	1.14	0.90		1.19	1.61	1.48		0.64	1.03	0.77		0.94	1.12	1.80		1.48	1.48	1.86		0.77	1.42	1.67	
June	1.09	1.12	0.90		1.19	1.03	1.19						1.22	1.22	1.62		1.12	1.19	1.37	1.22				
July	1.06	1.06	1.16		1.16	1.09	0.90						0.97	1.42	1.67	1.59	1.09	1.22	1.42	1.22				
August	1.22		0.92										1.00	1.67		1.67								
Sept.	1.03	1.24	0.90		0.58	0.80	0.69		0.75	1.28	0.77		0.87	1.34	1.55	1.28	0.59	0.77	1.28	1.16	0.77	1.28	1.80	1.03
Oct.	0.90	1.16	0.90						0.65	0.90	0.78		0.77	1.55	1.86	1.16					0.78	1.31	1.81	1.06
Nov.	0.70	1.06	0.90						0.65	1.06	0.78		0.77	1.22	1.74	1.28					0.78	1.31	1.59	0.78
Dec.	0.90	1.48	0.77											1.80		1.74								
Jan.	0.80	0.97	0.83		0.77	1.16	0.81		0.62	1.06	0.75		0.90	1.28		1.42	0.90	1.44	1.94	1.16	0.75	1.31	1.62	1.06
Feb.					0.77	1.16	0.75										0.83	1.42	1.94	1.03				
March					0.71	1.42	0.83										0.83	1.67	1.94	0.90			1.80	
Average	0.99	1.16	0.91		0.91	1.21	0.94		0.67	1.08	0.78		0.98	1.42	1.72	1.48	0.96	1.36	1.69	1.17	0.78	1.34	1.75	0.97

Source—Bulletin of Agricultural Prices issued by Directorate of Economics & Statistics.

APPENDIX XXI

Comparative price of shark-liver oil & its products in the States of Bombay, Kerala, Orissa and West Bengal during 1956-57

Name of product	Potency in International Units		Unit of price quotation	Price
	Vit. A	Vit. D		
<i>Bombay</i>				Rs. nP.
1. Sharkovit	1,000	100	10 oz. bottle 1 lb. bottle Per gallon	1.31 1.75 11.50
2. Elasumin liquid	20,000	2,000	1 oz. bottle 1 lb. bottle 1 gallon	1.62 12.00 88.00
3. Elasumin pearls	6,000	1,000	50 capsules 100 capsules 1000 capsules	1.75 2.50 25.00
4. Sloil preparation	600	85	1 gallon	2.75
5. Vet. Grade SLO	5,000	500	1 gallon	20.00
6. SLO neat (Crude Unfinished)	5,000 to 30,000	..	1 gallon	20.00 to 28.00

Kerala

1. Sea-gold Shark-liver-oil	.	.	.	.	.	1,500	100	24 lbs.	67.25
2. Stayfit Brand Shark-liver-oil	.	.	.	.	.	1,000	100	1 gallon	16.25
3. Adamin Liquid	.	.	.	.	.	12,000	1,000	1 lb.	30.00
4. Adamin Capsules	.	.	.	.	.	6,000	1,000	300 capsules	17.00
5. Vitamin 'A' oil	.	.	.	.	.	6,000	..	1 gallon	26.00
6. Vitamin 'A' oil	.	.	.	.	.	20,000	..	1 gallon	75.00
7. Veterinary Brand Shark-liver-oil "TRIVAX"	.	.	.	.	.	6,000	600	1 gallon	26.00
8. Vet, Brand Shark-Liver-Oil 'UNIVAX'	.	.	.	.	.	1,500	150	1 gallon	17.50

West Bengal

1. Shaliverol 'A' Grade	.	.	.	.	.	1,500	100	1 lb.	2.25
2. Shaliverol 'A' Grade	.	.	.	.	.	1,000	100	1 lb.	2.00
3. Shaliverol 'B' Grade	.	.	.	.	.	500	..	1 lb.	1.50

Orissa

1. Shark Liver Oil	.	.	.	.	.	12,000	..	1 lb.	8.00
2. Shark Liver Oil	.	.	.	.	.	6,000	..	1 lb.	4.50
3. Shark Liver Oil	.	.	.	.	.	1,000	..	1 lb.	1.50

APPENDIX XXII

Price spreads from producer to consumer in the marketing of fish (Figures in Brackets show percentage of consumers price)
(Data relate to one maund of fish during 1956)

Producer at	Gorang Beel (Assam)	Samaguri Beel (Assam)	Buxar (Bihar)	Balugaon (Orissa)	Mettur Dam
Consumer at	Gauhati (Assam)	Nawgaon (Assam)	Calcutta	Calcutta	Madras
Name of fish 1	Hilsa 2	Rohu 3	Cat-Fish 4	Beckie-Fish 5	Cat-Fish 6
Particulars	Rs. nP. Per- cent- age	Rs. nP. Per- cent- age	Rs. nP. Per- cent- age	Rs. nP. Per- cent- age	Rs. nP. Per- cent- age
1. Producer's price at landing ghat	80.00 76.2	60.00 74.8	42.26 52.4	57.70 53.6	12.81 44.7
2. Handling & Transport to curing establishment or assembling centre	0.50 0.5	1.00 1.2	1.00 1.2	0.08 0.1	1.00 3.5
3. Producer's price at assembling centre	80.50 76.7	61.00 76.0	43.26 53.6	57.78 53.7	13.81 48.2
4. Charges at assembling centre	5.00 4.7	4.00 5.0	4.75 5.9	11.36 10.5	7.00 24.4
5. Curing charges					
6. Handling & cartage from assembling centre to Rly. Station or bus stand			1.69 2.1	2.58 2.4	0.13 2.5

7. Cost F.O.R. Railway Station or bus stand	85.50	81.4	65.00	81.0	49.70	61.6	71.72	66.6	20.94	73.1
8. Railway freight or bus charges	..	..	..	..	6.75	8.4	6.00	5.6	2.25	7.9
9. Cost F.O.R. Railway Station or bus stand at destination	85.50	81.4	65.00	81.0	56.45	70.0	77.72	72.2	23.19	81.0
10. Handling Transport charges from Railway Station or bus stand to commission agents place of business	0.75	0.7	0.50	0.6	0.50	0.6	0.31	0.3	1.75	6.1
11. Charges paid for sale at destination i.e. Aratdar's & Market charges	..	..	..	..	4.75	5.9	7.95	7.4	1.13	3.9
12. Price at Commission agent's premises	86.25	82.1	65.50	81.6	61.70	76.5	85.98	79.9	26.07	91.0
13. Big retailer's margin	0.75	0.8	0.75	1.0	6.80	8.5	6.73	6.2	1.31	4.6
14. Cost at retail merchant's stall	87.00	82.9	66.25	82.6	68.50	85.0	92.71	86.1	27.38	95.6
15. Retailer's margin	18.00	17.1	14.00	17.4	12.12	15.0	15.00	13.9	1.25	4.4
16. Consumer's price	105.00	100.0	80.25	100.0	80.62	100.0	107.71	100.0	28.63	00.0

APPENDIX XXIII
INDIAN FISHERIES ACT

(Act No. IV of 1897.)

An Act to provide for certain matters relating to Fisheries (British India).

WHEREAS it is expedient to provide for certain matters relating to fisheries in (British) India it is hereby enacted as follows:—

1. (1) This Act may be called the Indian Fisheries Act, 1897;
(2) It extends to the whole of (British) India, except Burma; and
(3) It shall come into force at once.

2. Subject to the provisions of sections 8 and 10 of the General Clauses Act, 1887, this Act shall be read as supplemental to any other enactment for the time being in force relating to fisheries in any part of (British) India except Burma.

3. In this Act, unless there is anything repugnant in the subject or context—
 - (1) fish includes shell-fish;
 - (2) “fixed engine” means any net, cage, trap or other contrivance for taking fish, fixed in the soil or made stationary in any other way; and
 - (3) “Private water” means water which is the exclusive property of any person, or in which the person has for the time being an exclusive right of fishery whether as owner, lessee or in any other capacity.

Explanation.—Water shall not cease to be “private water” within the meaning of this definition by reason only that other persons may have by custom a right of fishery therein.

4. (1) If any person uses any dynamite or other explosive substance in any water with intent thereby to catch or destroy any of the fish that may be therein, he shall be punishable with imprisonment for a term which may extend to two months, or with fine which may extend to two hundred rupees.

(2) In sub-section (1) the word “water” includes the sea within a distance of one marine league of the sea-coast; and an offence committed under that sub-section in such may be tried, punished and in all respects dealt with as if it had been committed on the land abutting on such coast.

5. (1) If any person puts any poison, lime or noxious material into any water with intent thereby to catch or destroy any fish, he shall be punishable with imprisonment for a term which may extend to two months, or with fine which may extend to two hundred rupees.

(2) The Local Government may, by notification in the official Gazette, suspend the operation of this section in any specified area, and may in like manner modify or cancel any such notification.

6. (1) The local Government may make rules for the purposes hereinafter in this section mentioned and may by a notification in the official Gazette apply all or any of such waters, not being private waters, as the Local Government may specify in the said notification.

(2) The local Government may also by a like notification, apply such rules of any of them to any private water with the consent in writing of the owner thereof and of all persons having for the time being any exclusive right of fishery therein.

(3) Such rules may prohibit or regulate all or any of the following matters, that is to say:—

- (a) the erection and use of fixed engines;
- (b) the construction of wires; and
- (c) the dimension and kind of the nets to be used and the modes of using them.

(4) Such rules may also prohibit all fishing in any specified water for a period not exceeding two years.

(5) In making any rule under this section the Local Government may—

(a) direct that a breach of it shall be punishable with fine which may extend to one hundred rupees and, when the breach is a continuing breach, with a further fine which may extend to ten rupees for every day after the date of the first conviction during which the breach is proved to have been persisted in; and

(b) provide for—

- (i) the seizure, forfeiture and removal of fixed engines erected, or used, or nets used, in contravention of the rule, and
- (ii) the forfeiture of any fish taken by means of any such fixed engine or net.

(6) The power to make rules under this section is subject to the condition that they shall be made after previous publication.

7. (1) Any Police-officer, or other person specially empowered by the Local Government in this behalf, either by name or as holding any office, for the time being, may, without an order from a Magistrate and without warrant, arrest any person committing in his view any offence punishable under section 4 or 5 or under any rule under section 6.

(a) if the name and address of the person are unknown to him, and (b) if the person declines to give his name and address, or if there is reason to doubt the accuracy of the name and address if given.

(2) A person arrested under this section may be detained until his name and address have been correctly ascertained.

Provided that no person so arrested, shall be detained longer than may be necessary for bringing him before Magistrate, except, under the order of a Magistrate for his detention.

GLOSSARY

A

Adatya.—Commission Agent.

Anadromous.—Ascending rivers from the sea, at certain seasons for breeding purposes.

B

Bacteria.—One celled micro organisms which cause among other things decomposition of dead animal matter.

Bahardar.—Leader of a party.

Bahangi.—A pole, the ends of which are connected by rope to a flat contrivance for carrying loads, the pole being balanced on the shoulder.

Blanching.—Scalding.

Brine.—A strong saline solution generally of common salt.

C

Chapatti.—Unleavened bread made in thin flat cakes.

Chadu.—Same as Takli.

Coble.—A flat-bottomed fishing boat.

Crystalloid.—A substance which, in solution, diffuses readily through animal membranes and incapable of being crystallised.

D

Dhobi.—Washerman.

E

Enzymes.—Complex organic substances that accelerate specific transformations of material; ferments.

F

Filleting.—Removal of bones and sometimes skins also. The round fish when made into fillets are eviscerated, beheaded and split down both sides of the backbone, each fish thus yielding two fillets.

G

Gamla.—Large earthen vessel.

Ghat.—A platform jutting into the water.

Glazing.—To overlay with a thin surface coating of ice, in the case of frozen fish, to prevent desiccation. This is usually done by dipping frozen fish in ice cold water and removing when the moisture adhering to the fish freezes.

H

Hat.—A periodical market.

Hisabana.—A market charge levied for the services of an accountant.

J

Jhils.—Shallow inland lakes.

K

Kols.—Shallow tanks.

M

Mahajan.—A Money-lender.

Mandy.—A wholesale market.

Munim.—Clerk, Accountant.

Munj.—A kind of dried grass out of which ropes are made.

P

Peshkash.—A sum paid by an Indian chief for enjoying certain crown rights.

Pilchi.—A kind of elastic twig out of which baskets are made.

Puja.—Hindu worship.

R

Rabbetted.—A groove cut out of the edge or face of a piece of wood to receive another piece similarly treated. The two pieces are united at the edges.

Rigor.—Rigor mortis, the rigidity of muscles that occurs at death.

S

Sahukar.—A money-lender.

Selfbrine.—The saline solution impregnated with tissue fluids which excludes from a stock of dry salted fish. Moisture is withdrawn from the cells by osmosis and the salt dissolves in the expressed fluids.

Shandy.—Same as hat.

Shola.—A kind of reed whose interior is filled with pith.

T

Takli.—A spindle with a heavy weight attached to the bottom used for twisting fibrous material or yarn into strings.

Taint.—Spoilage.

Thatties.—A mat made generally of thin water of split bamboo.

V

Viss.—A unit of weight of retail trade in Madras equivalent to 3 lbs.

SUPPLEMENT TO THE REPORT

SUPPLEMENT TO THE REPORT

The main Report contains dates in some cases up to 1957 and in others up to 1958 according to the availability. Subsequent to the finalisation and printing of the Report, efforts were made to collect data on certain aspects *viz.* marine fish catches, imports, exports, prices etc. before its final printing.

These are discussed below:—

World catch of fish.—33.72 million metric tons of fish were caught throughout the world during the year 1958 as compared to 30.60 million metric tons (Revised figures) during the previous year indicating an increase of 10 per cent as will be seen from the table below:—

World catch of fish

(Million metric tons)

Continent	1957	1958
Africa	1.91	1.93
America North	3.95	3.90
America South	1.11	1.38
Asia	13.30	16.27
Europe	7.66	7.49
Oceania	0.13	0.13
U.S.S.R.	2.54	2.62
WORLD TOTAL	30.60	33.72

World catch by groups of species during these two years are shown in the following table:—

World catch of Fish by groups of species

(Million metric tons)

Group of Species	1957	1958
1. Fresh water fishes	3.51	5.28
2. Salmon, trouts, smelts etc.	0.71	0.70
3. Flounders, halibuts, soles etc.	0.66	0.76
4. Cods, hakes, haddocks etc.	4.47	4.33
5. Herrings, Sardines, Anchovies etc.	7.23	7.10
6. Tunas, bouitos, Mackerels etc.	1.83	1.96
7. Mulletts, Jacks, Sea-bases etc.	3.20	4.49
8. Sharks, rays etc.	0.33	0.32
9. Unsorted & Unidentified fishes	5.22	6.51
10. Crustaceans	0.82	0.75
11. Molluscs	2.04	2.01
12. Aquatic animals, n.e.s.	0.07	0.07
13. Aquatic plants	0.51	0.44
WORLD TOTAL	30.60	33.72

Production of sea fish in India.—The Statewise landings of sea fish during the years 1958 and 1959 are given in the table below:—

Landings of sea fish in India

(Metric tons)

State	1958	Percentage to total	1959	Percentage to total
West Bengal & Orissa	6,267	0.8	3,962	0.8
Andhra Pradesh	28,846	3.8	29,464	5.0
Madras	118,056	15.6	103,497	17.7
Kerala	294,655	39.0	191,375	32.8
Mysore	80,242	10.6	52,825	9.0
Bombay (including Saurashtra & Kutch)	222,886	29.5	198,192	33.9
Andaman & Nicobar	92	Neg.	123	Neg.
Mechanised Vessels	4,730	0.7	4,755	0.8
TOTAL	755,774	100.0	584,193	100.0

The total production which increased progressively from 1953 to 1957 showed a decline 13.7 per cent in 1958 as compared to the previous year. The 1959 figure showed a further decline of 22.7 per cent over the 1958 figure.

Total catch of sea fish during the years 1958 and 1959 according to different groups are shown in the following table.

Estimated catch of sea fish according to groups

Name of Group	1958		1959	
	Catch (Thousand metric tons)	Percentage to total	Catch (Thousand metric tons)	Percentage to total
1. Herrings & Anchovies	216	28.6	168	28.8
2. Meckerela & Perches	211	28.0	127	21.8
3. Crustaceans	87	11.5	68	11.5
4. Bombay Duck	67	8.9	58	9.9
5. Silver bellies	30	3.9	27	4.7
6. Jew Fish	26	3.4	20	3.5
7. Elasmobranchs	24	3.2	23	4.0
8. Cat fish	30	3.9	20	3.5
9. Pomfret	17	2.2	17	3.0
10. Bregmaceros	4	0.5	4	0.6
11. Flat fish	13	1.7	10	1.8
12. Indian Salmon	6	0.8	8	1.3
13. Dorab	6	0.7	6	0.9
14. Mulletts	3	0.4	2	0.3
15. Eels	9	1.2	6	1.0
16. Flying fish	(a)	0.1	2	0.3
17. Miscellaneous	7	1.0	18	3.1
TOTAL	756	100.0	584	100.0

(a) Below 500 metric tons.

Imports.—Imports of fish and fish products into India during the year 1959 are shown in the following table:—

Imports of fish and fish products into India during 1959

Particulars of fish	Quantity (cwts)	Value (000 Rs.)
1. Fish, fresh chilled or frozen	272,159	27,366
2. Fish dried unsalted	11,681	464
3. Fish dried salted	38	10
4. Fish wet salted	33,763	1,810
5. Prawns	..	..
6. Fish canned	1,106	195
7. Fish products, not canned	16	4
8. Fish maws and sharkfins	38	5
9. Cod liver oil	1,101	74
10. Fish oil—Whale oil crude	115	8
Sperm oil	1,547	112
Other oil	532	43
TOTAL	322,096	30,091

The total imports, which showed a decline during the years 1957 and 1958 as compared to the preceding years, increased by about 46·6 per cent in quantity and 44·4 per cent in value as compared to the previous year.

Exports.—Exports of fish and fish products from India during the year 1959 are shown in the following table:—

Exports of fish and fish products into India during 1959

Particulars of fish	Quantity (cwts)	Value (000 Rs.)
1. Fish, dry unsalted	176,906	14,328
2. Fish, dry salted	275,322	26,332
3. Fish, wet salted	30,422	570
4. Fish, fresh, chilled or frozen	1,208	75
5. Prawns	103,556	15,090
6. Crustacea excluding prawns	1,419	324
7. Fish canned	7,320	2,324
8. Fish products, not canned	3,969	117
9. Fish meal	26,940	496
10. Fish fertilizers and guano	26,380	660
11. Fish maws and sharkfins	5,565	1,899
12. Oil from fish and marine animals	4,662	127
TOTAL	663,669	62,342

The total exports during this year increased by about 10 per cent over the preceding year, there being considerable increase in the fish, dry unsalted.

Re-exports.—Only 18 cwts of sardines and pilchards canned valued at Rs. 5,716 were re-exported from India to Portugal during the year 1959.

Prices.—Available prices in respect of certain types of fish at Bombay, Calcutta and Madras for the years 1957 to 1960 are given in the following table:—

Average monthly wholesale prices of fish at Bombay and Calcutta
(Rs. per maund)

Month	At Bombay			At Calcutta			
	Cat fish	Prawns	Pomfret	Rohu	Backete	Hilsa	Chingri
1	2	3	4	5	6	7	8
1957-58:							
April . . .	15.44	37.28	87.45	87.50	80.00	47.50	85.00
May . . .	19.30	36.00	82.31	80.00	83.33	65.00	75.00
June . . .	20.58	36.00	102.87	90.12	96.66	67.50	82.50
July . . .	16.72	37.28	102.87	96.66	103.33	65.00	80.00
August . . .	20.56	38.05	102.87	106.00	110.00	87.00	115.00
September . . .	19.28	47.57	85.73	100.00	105.00	81.25	80.00
October . . .	15.44	34.72	77.08	90.00	80.00	60.00	75.00
November . . .	16.72	39.84	89.94	100.00	75.00	..	80.00
December . . .	20.46	44.48	96.00	93.33	70.00	..	90.00
January . . .	18.00	48.78	82.28	81.67	70.00	75.00	..
February . . .	18.00	51.64	87.17	91.67	80.00	75.00	..
March . . .	15.43	48.84	90.00	90.00	88.75	69.00	95.00
AVERAGE . . .	18.00	41.71	90.55	92.25	86.84	69.23	85.75
1958-59:							
April . . .	15.43	48.78	92.57	100.00	100.00	80.00	100.00
May . . .	20.56	57.60	106.97	102.50	105.00	85.00	100.00
June . . .	20.56	54.00	105.42	105.00	..	70.00	85.00
July . . .	23.12	61.71	108.00	100.00	..	70.00	85.00
August . . .	25.71	80.22	109.33	110.00	106.67	106.67	90.00
September . . .	24.43	84.86	100.28	..	..	..	..
October . . .	21.82	77.14	79.72	105.00	100.00	87.50	92.50
November . . .	19.58	34.97	59.65	103.33	93.33	85.00	91.67
December . . .	28.29	66.99	79.71	100.00	95.00	..	95.00
January . . .	27.77	65.43	100.59	102.00	92.50	91.67	90.00
February . . .	27.00	68.14	84.85	100.00	90.00	75.00	..
March . . .	25.72	65.57	84.25	100.00	90.00	75.00	..
AVERAGE . . .	23.33	63.78	92.59	102.53	97.00	82.58	92.13

1	2	3	4	5	6	7	8
1959-60:							
April . .	25.72	68.57	82.28	102.50	107.50	85.00	87.50
May . .	25.72	71.48	88.25	103.75	110.00	97.50	100.00
June . .	27.00	66.86	102.86	100.00	..	..	..
July . .	30.85	66.85	92.57	..	..	..	..
August . .	..	..	92.57	132.50	..	130.00	100.00
September . .	..	61.72	90.00	100.00	95.00	110.00	95.00
October . .	25.72	59.66	74.06	..	..	..	..
November . .	24.43	54.00	66.86	100.00	90.00	87.50	82.50
December . .	25.72	65.57	84.85	91.50	90.00	91.25	87.50
January . .	25.72	66.85	100.79	..	..	..	..
February . .	25.72	66.85	102.85	83.33	83.33	73.33	86.67
March . .	25.72	63.01	102.85	92.40	87.50	82.50	90.00
AVERAGE . .	26.23	64.67	90.08	100.68	82.92	94.63	91.15

Average monthly wholesale prices of fish at Madras

(Rs. per 100 lbs.)

Month	Freshwater fish			Sea fish					
	Carps	Prawns	Cat fish	Cat fish	Hilsa	Prawns	Pom-fret	Perch	Seer
1	2	3	4	5	6	7	8	9	10
1958:									
January . .	35.00	35.00	30.00	40.00	50.00	50.00	..	53.33	70.00
February . .	..	40.00	40.00	40.00	45.00	50.00	..	50.00	..
March . .	40.00	44.00	38.00	46.00	55.00	65.00	..	54.00	67.00
April . .	42.50	50.00	..	50.00	..	53.33	..	52.50	60.00
May . .	45.00	41.00	30.00	40.00	..	56.00	65.00	50.00	71.00
June . .	50.00	42.50	40.00	50.00	..	60.00	60.00	50.00	73.75
July . .	35.00	..	30.00	50.00	..	60.00	60.00	52.50	68.75
August . .	36.00	..	32.50	50.00	..	60.00	60.00	60.00	70.00
September . .	40.00	..	40.00	53.33	..	60.00	60.00	60.00	70.00
October . .	40.00	40.00	..	..	..	52.50	..	55.00	60.00
November . .	30.00	37.50	30.00	40.00	..	51.25	50.00	50.00	50.00
December . .	34.00	..	..	40.00	50.00	52.50	50.00	50.00	50.00
AVERAGE . .	38.86	41.25	34.50	45.39	50.00	55.88	57.86	53.11	64.59

	1	2	3	4	5	6	7	8	9	10
1959:										
January . . .		37·00	..	..	40·00	..	50·00	..	50·00	60·00
February . . .		33·75	..	..	40·00	..	50·00	..	50·00	60·00
March . . .		30·00	..	..	40·00	..	50·00	..	50·00	60·00
April . . .		30·00	..	..	40·00	..	50·00	60·00	52·50	61·25
May . . .		30·00	35·00	..	38·00	50·00	50·00	60·00	50·00	60·00
June . . .		35·00	35·00	..	40·00	..	50·00	56·67	50·00	60·00
July . . .		40·00	40·00	..	40·00	50·00	45·00	..	50·00	60·00
August . . .		50·00	40·00	..	40·00	..	50·00	60·00	50·00	60·00
September . . .		50·00	40·00	40·00	40·00	50·00	50·00	60·00	50·00	60·00
October . . .		50·00	40·00	40·00	40·00	..	50·00	50·00	50·00	60·00
November . . .		50·00	40·00	40·00	40·00	..	50·00	50·00	50·00	60·00
December . . .		50·00	45·00	..	50·00	..	50·00	..	50·00	82·50
AVERAGE		40·48	39·37	40·00	40·67	50·00	49·58	56·67	50·21	61·98
1960:										
January . . .		50·00	40·00	..	50·00	..	52·00	..	60·00	78·00
February . . .		50·00	..	..	48·75	..	50·00	60·00	60·00	67·50
March . . .		50·00	..	..	47·50	..	52·50	60·00	55·00	48·75
April . . .		45·00	45·00	45·00	46·00	..	66·00	66·80	52·50	40·00
May . . .		40·00	43·75	40·00	42·50	50·00	70·00	78·75	60·00	85·00
June . . .		45·00	45·00	40·00	41·25	..	62·50	81·25	61·25	85·00
July . . .		49·00	48·00	..	46·00	..	60·00	81·67	80·00	84·00
August . . .		45·00	55·00	..	50·00	..	67·50	80·00	75·00	80·00
September . . .		45·00	50·00	40·00	50·00	50·00	60·00	74·00	70·00	80·00
October . . .		47·60	50·10	40·08	50·10	..	60·13	70·15	70·15	80·17
November . . .		50·08	50·08	..	50·08	..	60·13	70·15	60·15	80·17
December . . .		50·10	45·10	..	50·10	..	60·16	80·17	70·15	80·17
AVERAGE		47·23	47·20	41·02	47·69	50·00	60·08	73·00	65·35	74·06

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PRINTED IN INDIA BY THE MANAGER GOVERNMENT OF INDIA PRESS
NASIK ROAD AND PUBLISHED BY THE MANAGER OF PUBLICATIONS DELHI-8
1961

